GAS JOURNAL, MARCH 2, 1938

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Editorial Notes

Rating

IT is of the utmost interest to learn that the Government propose at an early date to introduce legislation in regard to rating. The primary purpose of the legislation will be to postpone for two years the making of the Valuation Lists which would otherwise come into force at the beginning of April, 1939. The reason given for the postponement is that scarcity of housing accommodation still exists in some areas and has the result of maintaining at an artificially high value the house property in those areas. If houses in such areas are to be assessed upon a strict valuation there will be a lack of uniformity throughout the country. Whatever the main purpose of the postponement may be, gas undertakers will welcome the temporary respite from the labour and inconvenience of negotiations relating to the revaluations of their hereditaments. While there is, of course, nothing to prevent a rating authority or a gas undertaking from putting in a proposal to amend the current Valuation List at any time, it is to be hoped that, save where extraordinary circumstances exist, rating authorities will refrain from attempting to disturb valuations during the two years' respite.

It is gratifying to know that the Government have at heart the important question of the promotion of uniformity in rating assessments throughout the country, and it is to be hoped that the gross inequalities in the assessments of public utilities will not be overlooked. The suggestions of the public utilities for ending these anomalies are already before the Ministry of Health, and they are to a large measure supported by the views of the professional rating surveyors. Both public utilities and rating surveyors are agreed that Courts of Quarter Sessions are quite unsuitable tribunals to deal with rating questions so far as they concern public utilities. If uniformity of assessment is to be obtained, and the Government profess to desire it, some central tribunal is essential. Such a tribunal must be composed of members whose judgments will command respect and be binding throughout the country.

At present a large number of questions regarding the assessment of public utilities urgently demand an answer, and apart from the very costly method of appealing to the House of Lords, there appears to be no method of obtaining any solution. Is it unnatural that lay Justices sitting in Quarter Sessions avoid making pronouncements upon most difficult and complicated questions of law? Even if they were so brave as to attempt this task, their decisions would not be binding in any other area. So far, therefore, as public utilities are concerned, uniformity is impossible under the existing system. The introduction of legislation will no doubt afford an excellent opportunity to do what the Government omitted to do in 1925—*i.e.*, to place the procedure relating to rating on a satisfactory basis. No gas undertaking objects to paying its fair and equitable portion of local rates, but gas undertakings do demand that justice shall prevail in the method of arriving at assessments. This demand is the more pressing in that public utilities do not enjoy the derating benefits which have been conferred upon other industrialists.

The Cooking Load

DURING the past few weeks we have in these columns devoted a good deal of attention to the cooking load, discussing in particular the incidence of competition from electricity and pointing to the need for the Gas Industry to consolidate its position by re-selling this load. To-day there are about 7,000,000 gas cookers in use in Great Britain, accounting for about half of the total gas sold. This was mentioned in a short introduction to an important contribution to the proceedings of the London and Southern District Junior Gas Association by Mr. E. W. B. Dunning and Mr. R. F. Hayman, of the Watson House Laboratories. This Paper—we shall publish it *in extenso* in the "JOURNAL"—was concerned with domestic gas ovens and gave the results of a co-operative investigation undertaken by the Cooker Laboratory and the Home Service Section of the Gas Light and Coke Company into the relation of design to cooking quality. While recalling the valuable Paper on the subject given in 1923 by Dr. Harold Hartley, of Radiation Ltd., on the introduction of the bottom-flue "New World" oven, the Authors referred to the paucity of published information on this all-important attribute of a gas oven. Yet the gas oven consumption represents about an eighth of the total gas sold.

The Paper by Messrs. Dunning and Hayman was a comprehensive survey of the whole problem, and will prove of much help to other investigators in the same field. That the Authors have undertaken their task in a painstaking and thorough manner is obvious, and it is equally evident that work of this nature will render the retention of the gas cooking load the easier. It will, we suggest, serve a useful purpose if we direct attention to one or two of the findings in the Paper, which will, we are sure, be closely studied. We are glad, for instance, that once again the losses which occur during cooking were discussed. A reduced loss in weight on cooking has, as we all know, been an important argument in the selling of electric cookers, in some cases the supposed saving in weight loss having been credited in terms of meat to offset the higher fuel cost of electricity compared with gas.

It must be emphasized that meat contains 65 to 70% of water, and that practically the whole of the loss in weight of meat on cooking is due to loss of water vapour, and this has no effect on the food value of the cooked joint. Many comparisons of weight loss in gas and electric ovens have been reported by gas, electrical, and impartial investigators, and these have shown that when the conditions are standardized there is little difference. The bibliography given by the Authors will in this connexion and in others prove useful. Another point brought out in the Paper was that the higher humidity of the unventilated oven does not lead to lower weight losses, that the water content of the oven atmosphere is not a very important factor. On the question of the effect of products of combustion on the food the Authors referred to the work of Dr. Hartley, and they also mentioned that they had heated a porous pot full of distilled water in an internally heated gas oven. The water percolated through the pot and was evaporated, yet no trace of the products of combustion could be detected in the vessel or contents at the end of 50 hours' heating. As to the staining of walls, tests with modern gas and electric cookers have failed to show any material difference.

It will be remembered that in November last Mr. Dean Chandler contributed an article on the use of non-aerated flames in gas ovens. In that article he adduced evidence in favour of the luminous flame as regards the quality of food cooked. "Pastry and cakes," said one household after three months' experience of the oven fitted with non-aerated burner, "cooked in such an oven are markedly better in appearance and in taste than pastry and cakes cooked in any other oven of which we have had experience. Meats cooked in this oven seem, to some of us at least, to be of rather better flavour than when cooked in other ovens." Tests made at Watson House, stated Messrs. Dunning and Hayman, have not confirmed the view of Mr. Chandler. The experiments at Watson House included a series on the effects of five variations in oven flue design. The simple top flue outlet cooker proved to be the least efficient, but, observed the Authors, there is strikingly little difference between the other arrangements. The alterations in flue arrangement were made on an oven with two vertical flame burners and direct bottom flue outlet; and the conclusions reached in the Paper apply strictly only to this burner arrangement.

One section of the Paper was devoted to the effect of temperature on cooking quality. Tests were made to determine how much tolerance could be allowed in a thermostat before cooking quality was affected. Among the conclusions reached from this interesting phase of the work were that 16° F. is the minimum variation that produces differences in cooking quality detectable by experienced observers and that a range of 30° F. in oven temperature is possible without the average housewife detecting any difference in cooking quality. In regard to thermal efficiency, the Authors maintained that more attention should be paid to reduction of heat loss by metallic conduction, which would improve efficiency to a greater extent than increase in insulation thickness and would reduce external surface temperatures; and increased speed of heating up, they observed, should be possible using insulators with low thermal capacity and concentrating the thermal capacity in the linings, shelves, and so on.

It will be gathered from the foregoing that the Paper is one of much importance, and it is typical of the attitude of the Gas Light and Coke Company that the results of work carried out by their research workers should be made available for the benefit of the Industry as a whole. We commence publication of the Paper in our issue to-day.

Smokeless Zones

At a conference of local authorities in Greater London, called on Friday last by the Smoke Abatement Society, a resolution was carried that steps should be taken to promote the formation of an advisory regional smoke abatement committee for London and Greater London. This is a useful move and is indicative of the growing public concern with the nuisance of smoke and of the realization that the problem must be and can be tackled in a practical way. It is obviously more practicable for the Ministry of Health to deal with a committee representing a consolidated region than with a number of individual authorities which may hold conflicting views. A joint advisory committee could operate to good purpose in correlating the work of its constituents, in ensuring uniform administration, and in making propaganda fully effective; and it is surely up to London of all places to sweep away its reputation for griminess.

It is established that the domestic fire burning raw coal is the chief sinner in polluting the atmosphere. In London the proportion of domestic smoke to industrial smoke is of the order of 2·15 to 1; and at the conference Sir David Milne-Watson, who supported the resolution, mentioned that the sootfall on London amounts to 75,000 tons a year—anything up to 400 tons on a given square mile. He suggested that local authorities should obtain powers to offer a rebate in rate of, say, 3d. in the pound to householders who produce no smoke. Another proposal put forward by Sir David—and it is one which we have advanced previously in these columns—was that local authorities should combine to get powers to proclaim a smokeless zone covering the central areas. In this area the emission of smoke from any house, business premises, or factory should be forbidden after a certain interval, and the resources of the State, the local authorities, and the fuel industries should be combined to enable alternative measures to be taken with no individual hardship. As a practical move towards the abolition of smoke the establishment of smokeless zones appeals to us very much indeed. Certain city areas should at once be cleared of smoke, and the same principle could be applied to other selected areas, such as in the vicinity of hospitals and aerodromes. The possibility of being able to walk through an area without seeing a single smoking chimney would be of the greatest value. Smokeless zones—well defined areas to be specified and controlled by by-laws—would serve as examples to others outside these areas and would provide real incentive to further efforts to ensure a clean and healthy atmosphere.

Freedom of Choice

In the "Journal" for Feb. 16 we recorded that on a Labour amendment the South Shields Town Council had thrown out a Housing Committee resolution that gas should be installed in the houses of a projected municipal housing estate. Moving the deletion of the resolution, Councillor Newman said that, if gas was installed, then there would be renewed demands for gas for all domestic purposes on that and other estates owned by the Council—which seems to us a strange reason for denying the consumer the freedom of choice which has been recognized by Parliament. The matter was referred to by Mr. John E. Cowen, Chairman of the Newcastle-upon-Tyne and Gateshead Gas Company, in his speech at the annual meeting of the Company, when he pointed out that the Company is a very large ratepayer of South Shields. "Is it too much," he said, "to ask that our relations with the Coun-

cil should be complimentary rather than restrictive, notwithstanding the fact that the supply of electricity in South Shields is owned by the municipality. We do not fear competition and we look for no more and no less than fair treatment in our old-established business of offering supplies of gas to householders whether in municipally owned or other houses."

The South Shields Council, it would appear, regard obstruction to legitimate public demand in the vital matter of fuel supply as being in the public interest. How the public of South Shields is being "protected" is indicated by a statement on the matter made to a local paper by Councillor Gompertz, who declared that "it is high time the public understood what all this talk about the Gas Company means. It means nothing more or less than that the ratepayers of South Shields should subsidize the Newcastle and Gateshead Gas Company by laying down mains so that they can supply the commodity, and we should do our own undertaking material harm. Anything more ridiculous from a business point of view it would be hard to imagine." South Shields householders, we are sure, will not be slow to put a proper value on a childish notion such as this; and however much their councillors may be in the grip of electricity, South Shields housewives, knowing that they have an undoubted right to determine for themselves whether they will use electricity or gas, or both, will not rest content under dictation.

Mounting Industrial Sales

DURING the past few weeks the affairs of the great gas companies charged with the duty of supplying London and its immediate neighbourhood have called for commendatory reference in the editorial pages of the "JOURNAL," and it may have been thought by a very few that the story dwelt upon was peculiar to our unrivalled Metropolis. This, of course, is not so; the exact opposite is the true state of affairs. So much should have been gathered from the condensed reports which have been appearing in our pages of the results of working during the past year of gas companies operating throughout the Provinces, and what is stated there briefly was emphasized in last week's issue of the "JOURNAL" in three extended reports from different parts of this country. That is to say, having dealt thoroughly with Greater London, there have been made available to readers the proceedings at the annual meetings of three companies whose supply areas are situated respectively in the North, the South, and the West. The record in each case is the same as has been encountered in London; it is one of prosperity and progress.

Pause for one moment, and reflect upon the real significance of the following statement made, with full recognition of all that it implies, at a meeting of shareholders, by one of our well-known gas administrators. Mr. John E. Cowen, Chairman of the Newcastle-upon-Tyne and Gateshead Gas Company, says: "There is ample evidence throughout our area that the trend to-day is towards the use of gas as the form of fuel most suitable for industry. During the past year, 2,200 pieces of gas-consuming apparatus have found their way into local commercial and factory premises in one form or another." The Company's largest consumer, Vickers-Armstrongs, Ltd., are now taking more than six times the quantity of gas they consumed in 1932. Though it is realized that some of this increase is no doubt due to increased activity in the works, a large portion is in replacement of other forms of fuel. Again, take another industry long associated with Tyneside—the glass industry—the use of gas here is rapidly extending, and one of the Company's consumers is now taking over 200 million cu.ft. per annum. In another direction, the Royal Ordnance Factory at Birtley contains appliances capable of a consumption of gas at the rate of over 35,000 cu.ft. per hour. Granted re-armament—granted Newcastle's peculiar circumstances from the industrial point of view—the message to the Gas Industry at large can have but one interpretation: "Full speed ahead!"

Equally hopeful, though reviewing figures less pyrotechnical, is Alderman F. E. Beddow, D.Sc., who, addressing the proprietors as Chairman of the Portsmouth and Gosport Gas Company, told them: "We have been active in bringing before our larger customers the economies and efficiency which the application of gas to their various processes can secure. There is a great future for the use of gas for industrial large scale purposes; speed, reliability, flexibility, and low cost are securing for us new uses for our commodity." A large installation of baking ovens put in some time ago continues to give every satisfaction, and the consumption of gas from this source, which the Company hope to extend in the near future, is very considerable. For this purpose one of the largest bakeries in the district is using 14 million cu.ft. per annum, and constitutes the Company's biggest individual consumption outside of H.M. Dockyard.

In the West, all the indications point in the same direction. Results of mounting sales are that in the last twenty years the Bristol Gas Company have increased their output of gas by over 50%. Last year's sales were 87 million cu.ft. more than in 1936, and 217 millions more than in 1935, and this record consumption the Chairman, Mr. George H. Boucher, attributes to an extension of the use of gas both for domestic and industrial purposes. One of the most gratifying features of the Company's business is the increased use which is being made of gas for industrial purposes—in fact, the industrial sales now represent 17% of the Company's total output. "There is," declares Mr. Boucher, "a feeling of optimism about the Bristol Gas Company."

And not only about the Bristol Gas Company. There are solid grounds for optimism throughout the Gas Industry of the country, which will carry it much farther than it has yet gone—to a future that even a few years ago would have seemed fantastic. But however dazzling this future may prove, it will not have been won without continuous hard work and loyal co-operation, and contemplation of its brightness must not blind us to all that we owe to those, both highly placed and in the ranks, whose efforts on behalf of the Industry have helped to bring it thus far.

Heating and Ventilating Research

WE have previously called attention in these columns to the growth of the Institution of Heating and Ventilating Engineers and expressed satisfaction that the Gas Industry was taking a keener interest in its activities, that many members of the Industry had been elected to membership of the Institution, and that Papers on the use of both gas and coke had been contributed to the Institution's proceedings. This interest has not abated during the twelve months since last we wrote on the subject, and it is good to record—as was mentioned at the annual general meeting, reference to which has been made in the "JOURNAL"—that the membership is now what the Americans would term an "all-time high." This has all the more significance when one considers the qualifications which a candidate must possess before he can be admitted to membership. There is a well devised examination

scheme, and during recent years much more attention has been given to education and training.

Already the Institution of Heating and Ventilating Engineers has a high standing, and its status will undoubtedly be raised by plans which are now afoot. These plans were referred to by Mr. G. Nelson Haden in his Presidential Address. Entrance fees and annual subscriptions have been revised, the Institution will shortly move into larger and more dignified premises with a library and meeting room, and, what to our mind is most important, more money will be available for research. Founded in 1898, the Institution was not originally much concerned with the question of research, though shortly before the War it provided scholarships for graduates undertaking research at the University of London. Private and fairly crude research continued till about 1919, when the Institution began to take part in the direction of the research carried out at London University. This active participation produced useful information; it also created in the heating and ventilating industry a desire for something better than rules of thumb. Through lack of funds, however, this phase of research came to an untimely end in 1928, and thereafter the Institution took no part in it until the Department of Scientific and Industrial Research formed a Standing Advisory Committee on Heating and Ventilation, on which the Institution is represented. In 1930 proposals for a "controlled weather house" were considered, and the scheme was approved by the D.S.I.R. in 1931. Much good work has already been carried out in this all-weather house. Reference to recent investigations is contained in the latest Report of the D.S.I.R. Among them, for example, was the effect of the position of heaters in a room on the heat requirements, and it has been concluded that the same amount of heat is needed irrespective of whether the heaters are placed below the windows or against the inner walls of a room. Another was on the thermal conductance of a window, and experiments have confirmed that the round figure of 1 B.Th.U. per sq.ft. per hour per ° F., which is generally accepted for glass, is appropriate for use in calculating the maximum heat demand of a building.

We mention these items of research as showing how closely allied are the problems of the heating and ventilating engineer with many of those with which we have to deal in the Gas Industry; and the additional funds of the I.H.V.E. which are to be devoted to research will help to speed-up the work, to the benefit of all concerned. There is no doubt that close collaboration between the two industries is most desirable, and the personnel of the Gas Industry would be wise to take a still more active part in the proceedings of the Institution of Heating and Ventilating Engineers. We would point out, too, that this applies not only to London, but to the Provinces, where this collaboration is equally desirable. Already there are several Local Branches of the Institution, and the movement is growing. Participation in the affairs of these Branches would, we suggest, do much to further the cause of gas.

Important War Office Contract

SWINDON TO SUPPLY NEW ARMY DEPÔT

Central Heating, Hot Water, and Cooking

As we go to press we learn of a War Office decision which may prove of the greatest interest to the Gas Industry. In his speech at the annual meeting of the Swindon United Gas Company on Monday last, Major F. G. Wright, the Chairman, reported that the Company had obtained a most substantial order for the supply of gas to a new Army Depôt which is being built at Shrivenham. This contract—the largest order ever placed for gas by the War Office—is for a period of no less than 21 years for gas not only to the married quarters but to the whole establishment for the purposes of central heating, hot water supply, and cooking. The load is estimated at 150 million cu.ft. annually, representing an increase of nearly 35% of the Company's output. The Swindon United Gas Company may well feel proud of this achievement, which will be a source of gratification to the Gas Industry as a whole. The long-term contract is proof of the belief of the War Office in the excellent service which gas can render economically.

Street Lighting Restrictions in Time of War

There has, for some time past, been speculation among responsible public lighting engineers as to special measures that might be required by the Home Office in respect of street lighting in time of war. The absence hitherto of an official pronouncement by the Home Office concerning the national policy in this matter has led to a widespread acceptance, even among local authorities, of certain assumptions, in particular that street lighting would be permissible in war time, but would have to be completely extinguished immediately upon the receipt of an air raid warning.

The Joint Lighting Committee of The Institution of Gas Engineers, upon which are represented the British Commercial Gas Association, the National Gas Council, and the Society of British Gas Industries, has carefully investigated the implications of such possible requirements, and has in its possession information as to various systems and devices for the instantaneous extinction of gas street lamps.

Any uncertainty as to policy is, however, now dispelled by the publication and circulation to local authorities by the Air Raid Precautions Department of the Home Office of a Memorandum on Lighting Restrictions in Time of War. The policy now officially stated by the Home Office is the result of a considerable number of large-scale trials, some of which have, from time to time, been reported in the Press.

It is laid down in this Memorandum that: "Normal street lighting will not be permitted in time of war." All street lamps will have to be extinguished at the outbreak of hostilities and remain extinguished throughout the period of war. Aids to traffic in the darkened streets, such as reflectors, white markings, or dim and well-screened indicator lights, would be required in all streets likely to carry considerable traffic.

The Memorandum further states: "It is not thought that further experience will reveal the need for any modification of these proposals. If any relaxation were found to be necessary, it would not go beyond permitting between raids a certain amount of modified street lighting, carefully screened and capable of being instantly extinguished on receipt of an air raid warning, in the main thoroughfares of the largest towns, and then probably only in the less exposed parts of the country." The Home Office does not, however, at present contemplate permitting any form of street lighting in war time.

The Joint Lighting Committee is in close touch with the Air Raid Precautions Department of the Home Office on the subject of war time street lighting. In case of any difficulty in this connexion, advice may be obtained from The Secretary, The Institution of Gas Engineers, 1, Grosvenor Place, London, S.W. 1.

Institution of Gas Engineers

British Standards Specification

Copies of the following recently issued British Standard Specifications may be obtained, price 2s., each, from the Secretary of The Institution of Gas Engineers:

No. 765-1938.—Internal-Combustion Engines. Carburettor-type, excluding aero-engines.

No. 771-1938.—Synthetic Resin (phenolic) moulding materials and mouldings.

Copies of the following recently issued British Standard Specification may be obtained from the same address, price 3s. 6d.:

No. 781-1938.—Wrought iron chain slings and rings, links alternative to rings, egg links, and intermediate links.

Letters to the Editor

Salaries of Gas Engineers

SIR,—I must say I stand corrected by "Dare Lucem," as I really have not made any suggestion as to a possible solution for the terribly poor salaries that are being paid, but I have at least the courage of my convictions because I always sign my *name* to any letters I write.

For "Dare Lucem's" own information I may say that I have done a little bit of work in the background, for which I have not sought publicity in the Press.

Matters are proceeding!

Yours, &c.,
C. S. SHAPLEY.

Leeds,
Feb. 26, 1938.

SIR,—"Dare Lucem" is scarcely logical in his taking Mr. Shapley to task, and, furthermore, shows himself to be ill-informed, a misfortune similar to that which he attributes to Councillor Muter and other sympathizers. He seems to complain of Mr. Shapley's activity with a rake, but he himself promptly falls on the bone Mr. Shapley brought to the surface.

"Dare Lucem" claims a long experience. So also may Mr. Shapley. The writer remembers Mr. Shapley's special and courageous interest in this matter nearly twenty years ago, when he held a position, as he does now, where he would be less likely to reap any personal benefit than his smaller brethren whose cause he worthily champions.

"Dare Lucem" states that the minimum scale of the "electrical people," mentioned by Mr. Shapley and others, is "a failure and useless," yet he himself later makes his special contribution—viz., that an adequate minimum scale be prepared and *enforced*.

Mr. Shapley and his supporters are not wholly without knowledge and wisdom, as may be seen by "Northerner's" letter. It is true that the scale negotiated by the Associated Municipal Electrical Engineers has not been universally adopted, but it is not true to say that it has been "a failure and is useless," as many engineers who are being paid on that scale could testify. There are also many whose salaries have been improved by reason of the existence of the scale, although not paid the full scale figure. It is possible there may even be some gas engineers and other municipal officials who have derived benefit indirectly from the existence of the A.M.E.E. scale.

Regarding the latter portion of his third paragraph; no doubt "Dare Lucem" speaks as truly as his knowledge permits.

Owners of gas undertakings should readily appreciate the advantage it would be to the undertakings for the engineers to be paid basically on the annual output of gas, as it would be a continuous stimulus to sales efforts. Would an electrical engineer be blamed if he made a calculation as to the amount by which his salary would be increased by replacing, say, one gas cooker per day with an electrical cooker? And would not a gas engineer be innocent of censure if he made a calculation as to how much his salary would be decreased if he did not keep those electrical cookers off the district?

It is conceivable that the universal adoption of a minimum salary scale based on output would lead to the general adoption by the gas supply industry of the two-part tariff as those foolish and misguided electrical people have done.

Yours, &c.,
"CALCULATOR."

Feb. 23, 1938.

SIR,—"Northerner" suggests the formation of a Municipal Gas Engineers Association and that a meeting be convened during Institution week to consider the matter. These ideas should surely commend themselves to municipal gas engineers generally.

It might be useful for the municipal members of the various district associations to meet locally some time prior to Institution week to give preliminary consideration to the proposal. It might also be considered whether it is feasible and desirable for there to be a gas engineers' section of the N.A.L.G.O. (National Association of Local Government Officers) as an alternative to the formation of a separate association.

Yours, &c.,
E. W. WOOTTEN.

Selby, Albert Park Road,
Malvern.
Feb. 26, 1938.

Personal

Mr. W. HARDING, Manager and Secretary, has been appointed to fill a vacancy on the Board of Directors of the Ripley Gas Company.

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Mr. ROBERT POOLE, a Director and Secretary of Richmonds Gas Stove Company, Ltd., has been appointed General Manager of the Company.

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Mr. CHARLES E. SMITH, Assistant Engineer and Manager to the Aberdeen Gas Department, is retiring shortly after forty-six years' service with the Corporation.

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The post of Distribution Superintendent to the St. Helens Gas Department has been filled by the appointment of Mr. H. FIRTH, who was previously Distribution Engineer at Halifax.

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Mr. W. W. ATLEY, who has been Engineer and Manager of the Stockton-on-Tees Gas Department since 1920, has been appointed Engineer and General Manager of Messrs. Athole G. Allen (Stockton), Ltd., Chemical Manufacturers.

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Mr. E. C. MANFRED, who for 56 years has acted as Manager of the City of Goulburn Gas and Coke Company, Ltd., Goulburn, New South Wales, has lately retired from this office. Mr. HUME L. MANFRED, the former Secretary of the Company, is now Acting General Manager.

"GAS JOURNAL" Directory

In order that readers may be able to keep the particulars contained in the "JOURNAL" Directory up to date, we summarize in the following list various changes which have occurred during the past month:

Page 4. ANDOVER. G. T. Temblett appointed M.D.
„ 10. BRIDPORT. J. L. Mayes appointed E., M., & S., vice W. H. Reed, retired.
„ 12. DISS (Norfolk) has been omitted from the list of Stations of the British Gas Light Company. A. L. Higham, E. & M. Appropriate correction should also be made on page 120.
„ 24. FALMOUTH. F. G. Kingwell appointed M. & S.; E. H. Hart, E.
„ 48. NEWCASTLE-UPON-TYNE. T. P. Ridley appointed G. M.; R. Gray, C. E.
„ 52. PADIHAM. J. W. Roberts appointed E. & M.
„ 56. READING. D. H. Helps appointed D.
„ 56. RIPON. J. Roberts, E., M., & S., resigned.
„ 64. STOCKTON-ON-TEES. W. W. Atley, E. & M., resigned.
„ 72. WELLS (Som.). C. Dunn appointed E., M., & S., vice G. F. Dunn, retired.
„ 82. DUMFRIES. S. Dickie, E. & M., retired.
„ 84. GIRVAN. T. F. Scott appointed E. and M.
„ 94. CARRICKFERGUS. R. Campbell, E., M., & S., deceased.
„ 130. GOULBURN. E. C. Manfred, M., retired; H. L. Manfred appointed Acting G.M.
„ 150. GAS COMPANIES' PROTECTION ASSOCIATION. F. G Brewer appointed Chairman, vice R. W. Edwards, deceased; C. F. Botley appointed Vice-Chairman.

News of the Week

The Price of Gas at Buckie has been reduced from 5s. 10d. to 4s. 2d. per 1,000 cu.ft.

An Offer from Messrs. W. C. Holmes & Co., Huddersfield, for the installation of a new Connersville meter has been accepted by the Falkirk Town Council.

Lanarkshire County Lighting Engineer has been instructed to prepare a report as to the cost of a scheme for better lighting of main trunk roads in the county.

The Manchester District Association are holding their Annual Meeting at the Midland Hotel, Manchester, on Friday, March 18, when Mr. E. Astbury, Chief Engineer to the Liverpool Gas Company, will deliver his Presidential Address.

Hinckley Urban Council Lighting Committee has asked Mr. A. B. Britton, Engineer, Manager, and Secretary of the Hinckley Gas Department, to submit schemes for the better public lighting of Sapcote Road, London Road, Ashby Road, and Barwell.

For Chivalrous Conduct and Courtesy on the road, Mr. Claude Johnson, driver of a Cambridge University and Town Gas Light Company vehicle, has been informed that his action was seen by a *News of the World* observer, and of his election to the "Knights of the Road Guild."

The Annual General Meeting of the Southern Association of Gas Engineers and Managers will be held at the Hotel Victoria, London, W.C.2, on Friday, March 25, at 2.30 p.m., when Mr. D. C. Cross (Engineer and General Manager of the Lea Bridge District Gas Company) will read his Presidential Address.

Fire Broke Out in the Bury Gas Department's workshop in Millett Street last week. Breaking into the workshop, the firemen found that wooden work-benches and cupboards and accessories stored on the premises were well alight. It is suspected the fire was caused by a heated tool being left on a wooden work-bench.

Four New Purifiers and other plant at the Works of the Buckhaven and Leven Gas Commissioners were formally inaugurated on Feb. 24 by the Chairman, ex-Provost Lister, who said that 81 million cu.ft. of gas was being sold when the Undertaking was acquired and the figure last year was 159 million cu.ft. The maximum daily output had risen since 1922 from 375,000 to 613,000 cu.ft.

The Second Week of the *Kentish Mercury* Food and Health Campaign, in which the South Metropolitan Gas Company are co-operating with cookery demonstrations and film displays, was inaugurated at Blackheath on Feb. 21 by the Mayor of Greenwich (Councillor H. H. Gibbons, J.P.), with whom was the Mayoress and the Medical Officer of Health for the Borough. This week the demonstrations are being held at Eltham and we hope to make reference in our next issue to the inauguration by Sir Kingsley Wood, the Minister of Health.

Chatteris Gas and Coke Company has recently been reorganized and is now under entirely new management. Arrangements have been made to supply consumers with up-to-date appliances.

Two Important Heating Installations have recently been put into operation in Stratford-upon-Avon. In the new Municipal Offices a gas-fired central heating system has been installed, and hot water for the lavatories is provided by gas water heaters. The large greenhouses at the New Place Gardens have been changed over from coke firing to automatic gas heating. It is in these greenhouses that the bedding plants are raised for the grounds of Shakespeare's Birthplace, Anne Hathaway's Cottage, and the other Shakespearean show places.

Among the Latest Applicants for a factory site at Hillington Industrial Estate, Renfrewshire, is the British Gazogenes Company, a new undertaking which proposes to equip motor vehicles, farm tractors, fishing boats, and small stationary power plants with the French Gohin-Poulenc system of propulsion by producer gas derived from smokeless coal or charcoal, the Company having secured the French rights for the whole of the British Empire. The Duke of Montrose and Sir Alexander MacEwan are the sponsors of the undertaking. The economy effected by the use of producer gas over petrol or Diesel oil in the propulsion of heavy vehicles and tractors is claimed to be very great, amounting in some cases to 60%. Over 4,000 plants of this type are in operation in France; there being others in the French Colonies, Germany, and Italy.

A Comprehensive Display of all modern types of cooking apparatus has been staged by the Cambridge University and Town Gas Light Company during National Gas Cooker Fortnight. Model kitchens have been constructed to display cookers with other labour saving devices which are available for the housewife of to-day. The re-constructed lecture theatre was used for the first time on Feb. 21, when a series of afternoon and evening cookery demonstrations started. The Mayoress of Cambridge, Mrs. Saville Peck, performed the opening ceremony, being introduced by Mr. F. J. Dykes, a Director of the Company, supported by the Engineer and Manager, Mr. J. Hunter Rioch, and Mrs. Rioch. Mrs. Peck, in the course of her remarks, had nothing but praise for gas cookery, which she had experienced for a number of years, and knew it to be efficient, clean, and economical. Miss M. K. Gompertz, M.C.A., is the cookery demonstrator during the first week, and for the continuation of the series, Miss Hilde Zimmermann is to deal with Continental cookery. The country consumers are not being forgotten, and Miss M. Ebden, the Home Service Advisor of the Cambridge Company, will provide demonstrations at the branch showrooms at Cottenham and Willingham. An ingenious kitchen planning competition is attracting a very large entry.

Amalgamation and Grouping

St. Helens and Rainford.

St. Helens Corporation has opened negotiations with the Rainford Gas Company for the transfer of the Gas Undertaking to the Corporation. Rainford Council last week decided to ask the Corporation to send a small deputation to meet Rainford Council at Rainford to supply information on the terms and conditions on which it is proposed to acquire the Undertaking.

Stellite, Ltd., and Llandudno.

A motion urging the Llandudno Urban Council to take a plebiscite of the ratepayers with a view to ascertaining whether they were in favour of selling the Gas Undertaking for £107,000, *plus* certain guaranteed concessions for ten years to the Stellite Company, of Queensferry, was defeated.

Before the discussion, the Clerk reported the receipt of a petition signed by 2,414 ratepayers and gas consumers asking for a plebiscite in the terms of the motion. Mr. R. C. Baxter (Chairman of the Gas Committee), who strongly opposed the notice of motion, said the minority which opposed the sale of the Gas Undertaking was insignificant. The Council had been considering the position since December, 1936, and could not see how the ratepayers could come to an intelligent decision in a few weeks' time. The majority of the Council was firmly convinced that it would be in the best interests of the consumers and ratepayers generally to accept the offer made.

South Suburban Gas Company

Change of Accounting System

After some seven years' operation of monthly accounting, the South Suburban Gas Company have reverted to rendering quarterly accounts as from the beginning of last month. The system, however, is based on continuous meter reading, whereby one-third of all meters will be read each month.

Consumers who receive accounts for February will be charged one month's charges in respect of that month and will not receive a further account till May. Similarly, consumers whose meters are read in March will be charged two months' charges in respect of February and March and no further account will be rendered till June. The remaining meters will be read in April, covering the period February, March, and April, this representing charges for the three months since the previous account for January.

Thereafter accounts will be rendered in accordance with this three-monthly sequence.

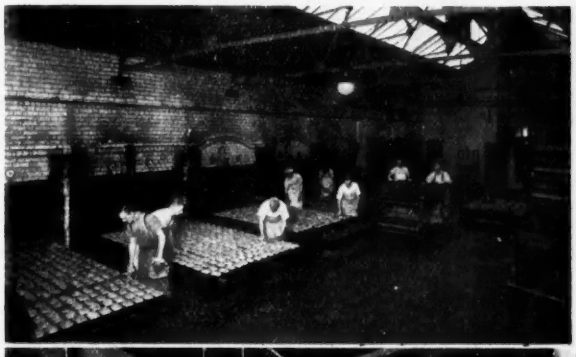
Invoices relating to fitting work, &c., will be despatched as soon as possible after the completion of the work, and coke invoices will be left with consumers at the time of delivery. Any such amounts outstanding when the subsequent gas account is rendered will be included in that account as an outstanding charge.

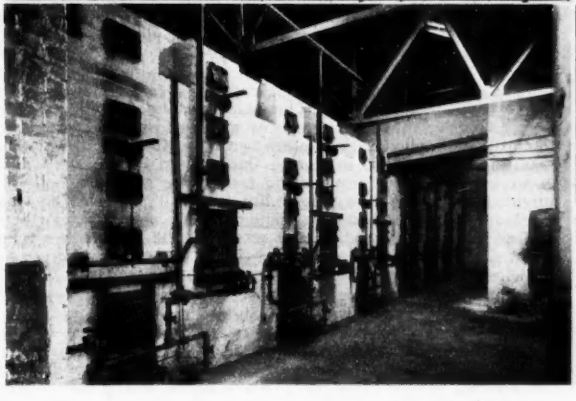
In the course of a notice sent out to consumers explaining the new system, the Company state that this represents the practice most generally adopted by public utility undertakings with regard to meter reading and believe it will better meet the requirements of the majority of consumers.

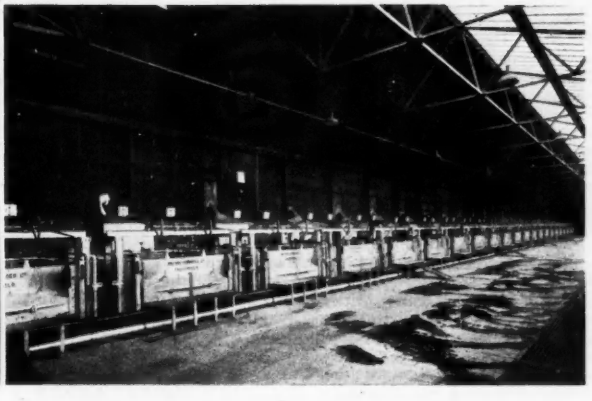
Newcastle's Growing Industrial Demand

Large-Scale Applications of Gas

These pictures indicate some of the applications of gas as an industrial fuel in the area of the Newcastle-upon-Tyne and Gateshead Gas Company where great strides are being made in developing the industrial gas load. Reference to this was made in our issue for Feb. 16, when we mentioned that of the total gas sold more than one-third finds it way into industry. Much work of special interest has been undertaken. Particular attention has been given, for instance, to the requirements of the processes associated with non-ferrous metals. Very large quantities of gas are now used for melting, extruding, and the annealing of extruded sections, for the rolling and annealing of brass sheets, and for the annealing of cold drawn brass work. In three works alone these processes are responsible for a consumption of more than 150 million cu.ft. of gas per annum. It is not only in engineering that gas finds a useful industrial outlet. Practically every trade requiring process heating can employ gas with advantage. An example is provided by the foodstuffs industries. Gas is very commonly used in the heating processes of foodstuff factories, and particularly in bread-making plants. In the area, served by the Newcastle Company, there are two bakeries using gas-firing exclusively which have a combined output of 15,000,000 loaves per annum, as well as cakes to the value of more than £100,000. The soap industry provides another example. One factory has an output of more than 7,000,000 packages of soap per annum. It is claimed that this is the largest gas-fired soap-drying plant in the country. The glass industry on Tyneside consumes more than 300 million cu.ft. per annum.







The Largest All-Welded Gasholder in Great Britain

Interesting Features of Construction

Over 880 tons of steel were welded into one homogeneous whole in the construction of the largest all-welded gasholder in Great Britain, which was erected for the Stratford and District Gas Board at Sale, Cheshire, by the Oxley Engineering Company, Ltd., of Clarence Road, Hunslet, Leeds, 10. The capacity of this holder is 2 million cu.ft., there being four lifts. The inner lift is 141 ft. 10 in. and the outer 150 ft. in diameter; all four lifts are of the same depth—viz., 31 ft. 8 in. The steel tank, which is also of all-welded construction, is 152 ft. 6 in. diameter and 33 ft. deep.

The bottom plates of the tank are $\frac{1}{4}$ in. thick throughout, and the side plates vary in thickness from $\frac{5}{16}$ in. to $\frac{1}{4}$ in. The design of the vertical stays to the tank is of special interest, the vertical angles being welded to the tank shell plates. The sides of the lifts are constructed on the Oxley patented system, all intermediate sheets being fixed spirally and parallel to the spiral rails. The circumferential purlins which are embodied in the patent are curved to the radius of the lifts, and fitted between the vertical stays, keeping the frame perfectly true to shape. These purlins are additional to the orthodox riveted design. Location holes are provided in the top and bottom rows and the spiral rail plates, but there are no holes in the intermediate sheeting. All seams in the side sheeting are continuously welded both inside and outside. The welding on the outside is semi-downhill, and on the inside semi-overhead. The spiral rails are tack welded into position without the aid of location holes, and finally continuously welded on both edges.

An interesting feature of this holder is that it is the first to be fitted with Oxley patented overflow and return ducts to the cups. These fittings prevent all excess water during cupping from being discharged over the top of the dips. During uncupping the working is reversed, and water is automatically returned into the cup, thereby preventing the blowing of the seal, during this operation.

The roof framing to the inner lift is of a special design; each ring of purlin bars is self-locating. The orthodox arrangement of the roof framing members was departed from, giving thereby a simplified form of welded construction which resulted in a roof of a very accurate shape and of exceptional rigidity.

For the all-welded holder a great saving in maintenance is claimed. As will be appreciated, the principal cost on a gasholder in this respect is painting, and as there are no rivet heads or crevices, the cost of painting is considerably reduced on a gasholder of 2 million cu.ft. capacity. In addition, as there are no lodgment places for water the paint lasts much longer.

The importance of an absolutely gas-tight holder cannot be over emphasized. When it is learnt that under a pressure of 12 in. w.g. gas will leak through a hole of only $\frac{1}{4}$ in. diameter at the rate of 2,848 therms per annum, assuming a calorific value of 500 B.Th.U. per cu.ft., the desirability of avoiding even the smallest leak is only too apparent. We learn from the Oxley Company that very serious leakage has resulted in the seams of oil-filmed holders due to the action of the oil on the tape. The firm claim, on the other hand, that welded gasholders do not leak; the welded joints remain perfectly tight against the breathing action of the holder.

In addition to the Sale holder, the Oxley Engineering Company have erected an all-welded holder of 150,000 cu.ft. for the Newhaven Gas and Coke Company. With the provision of a third lift, this holder will have a capacity of 230,000 cu.ft.

New Showrooms Opened at Hemel Hempstead

Pursuing their progressive policy of extending their service centres into outlying districts, the Watford and St. Albans Gas Company opened on Monday last attractive new showrooms and offices—the fifteenth in their area of supply—at Hemel Hempstead.

Some indication of the progress made by gas in Hemel Hempstead is provided by the fact that when the former showrooms were opened in 1915 the number of consumers supplied was 2,224; to-day there are well over 8,000 consumers, while nearly four times as much gas is sold. This development, coupled with the progressive policy of expansion adopted by the Watford and St. Albans Gas Company, have necessitated the erection of new showrooms in Marlowes. These were opened on Monday by the Mayor of Hemel Hempstead, Alderman Henry Fletcher, J.P., in the presence of a gathering representative of the public life of Hemel Hempstead and district. In his remarks His Worship referred to the progressive policy of the Company and the ready help it was offering to the public, particularly in respect of home service. He wished the Directors the success which they undoubtedly deserved.

In reply, Mr. Frank H. Jones, Chairman and Managing Director, thanked the Mayor for his kind references, and went on to recall that the inhabitants of Hemel Hempstead had enjoyed the benefit of a gas supply for 102 years. Since the Watford and St. Albans Company had taken over the old Hemel Hempstead Company the number of men employed had increased considerably, and these were now enjoying the benefit of the Company's Co-Partnership Scheme. Mr. Jones then presented the Mayor with a small souvenir of the occasion and Master Eric Owen presented a bouquet to the Mayoress, on whose behalf the Mayor suitably replied.

Among those present at the ceremony were Mr. G. Wilks, General Manager and Secretary, Mr. T. C. Battersby, Chief Engineer, and Mr. H. M. Lipscombe, Director.

The new premises, which are situated in a central position in Marlowes next door to the splendid new Post Office building, represent a handsome addition to the architectural amenities of the town. The exterior is in the modern Georgian style in red brick relieved with white stone to harmonize with the Post Office. The building has two storeys; the lower floor forms the showroom and the upper is largely devoted to the demonstration theatre. There are also rooms on both floors which will be used as offices for the district superintendent, slot collectors, and general staff. Behind the building are garages.

The main central entrance is flanked by two large "open" windows which afford a generous amount of light for the interior. Here it might be mentioned that the airy light atmosphere which pervades the premises is most noticeable. This has been achieved by a judicious combination of ample window area and dainty colour scheming. Pale cream and light green shades, enlivened with little gay touches of red, have been used throughout with great effect. On the left as one enters there is a water-heating section with various types of water heater, bath, and basins tastefully arranged beneath a gas-illuminated laylight. At the opposite end of the showroom there is a similarly illuminated alcove display of a gas-ignited coke fire. These laylights when illuminated at night present a striking spectacle to the passer-by. At the back of the showrooms there is the cash-desk with a rather unusual, but very handsome, screen, through which the consumer settles his account. Here the panelling is carried out in Australian Silky Oak, while the flooring is parquet teak and rubber.

The demonstration theatre is capable of seating over 100 persons in perfect comfort. The stage has been equipped with a representative range of appliances without losing the certain direct appeal of simplicity. There are two Gas Meter Company demonstration dial meters, indicating the amount of gas used and its cost in performing any specific task. The dials are both floodlighted to facilitate easy legibility from all parts of the theatre. Behind the stage there is a small kitchen, where tea can be prepared for those attending any sessions. Off the theatre there is also a small room which will be used for such purposes as home service consulting.

Throughout local heating is used to warm the building, and all lighting is switch-controlled. Should it ever be found inconvenient to admit consumers to demonstrations through the showrooms, there is a separate entrance at the side of the building giving direct access to the theatre. The normal method of entry, of course, will be through the showrooms, where consumers can inspect appliances. Demonstrations will be given every month by Miss Irene Brookes, Home Service Consultant. During this week, however, to launch the new showrooms well, and truly, there are daily demonstrations, film shows, cake-making competitions, and television.

The Architects were Messrs. Dawe and Carter, 83, High Street, Watford, Mr. Peter G. J. Carter, A.R.I.B.A., being personally responsible for the work. The builders were Messrs. William King & Sons, Watford.

Doncaster's New Showrooms Opened

New showrooms in Silver Street for the Doncaster Corporation Gas Department were formally opened last week in the presence of members of the Corporation, representatives of neighbouring local authorities, and members of the Gas Industry.

Proposing the toast of the "Doncaster Gas Undertaking" at a luncheon following the opening, Ald. J. H. Waddington (Chairman of the Halifax Gas Committee) said Doncaster had been connected with the Gas Industry for over a century. The effectiveness of a gas supply was determined first by the usefulness of the appliances, and secondly by the prices. In the last ten years the Industry in Doncaster had increased by 50%. Production efficiency, distribution efficiency, and utilization efficiency were the essentials of success and the beginning must be made in the committee room.

Responding, Ald. W. J. Crookes said all progressive commercial houses had proved the undeniable advantages of showrooms, not only to the salesman but to the customer.

Mr. E. H. Shaw (Vice-Chairman of the Gas Committee), proposing the toast of "The Visitors," said that for a long time they had lacked suitable showrooms, but they had now put their goods in the window and were hoping to make up a good deal of leeway. Mr. G. E. Currier (Gas Engineer of Bradford), in responding, said the showrooms were typical of what was best and most modern in the Gas Industry.

The Rangers

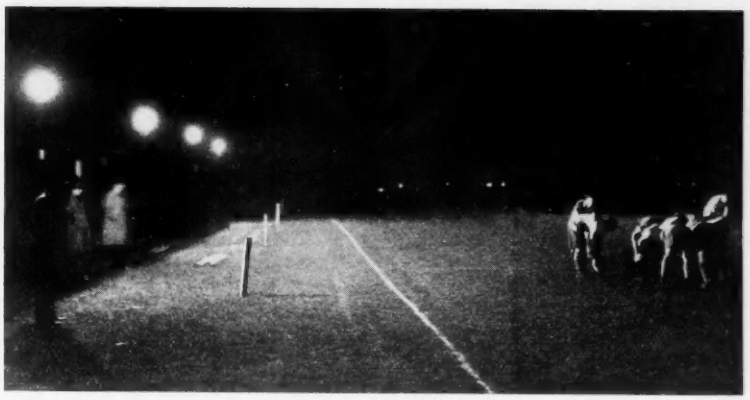
Famous City Livery Company to be Associated

The Worshipful Company of Salters, of which Sir Ralph Glyn, M.C., M.P., D.L., is the present Master, are to be associated with "The Rangers," the King's Royal Rifle Corps, of which Sir David Milne-Watson, Bt., is Honorary Colonel, and Lieut.-Colonel F. M. Potter, O.B.E., is Commanding Officer.

This is part of a movement to revive the ancient practice of the City Livery Companies in maintaining an interest in the Armed Forces of the Crown.

The valuable work of the Salters Company in connexion with Chemical and Chemical Engineering education is well known, and the selection of "The Rangers" is interesting for the fact that a number of the officers are engaged in the chemical side of the Gas Industry and 85% of the personnel are employed by the Gas Light and Coke Company. For the past 14 years the latter Company has granted special leave privileges to serving members of the Territorial Army. The Battalion has a high reputation for efficiency and it is usually well to the fore in competitions open to the Territorial Army.

Training by Gas Floodlighting



The Saracens, even if they form one of the oldest Rugby Clubs in London—they were founded way back in 1876—are by no means behind the times in their latest move to improve the playing standards of their fifteens. Fixtures have been improving steadily during recent years and during this season nine XV's have been fielded regularly every Saturday afternoon. Apart from the 1st XV, three sides of "A" standard have given evidence of the general high quality of play in the Club.

To maintain and improve the present position without constructive team training is almost an impossibility, so that although realizing that individual members were undertaking training by themselves or in a small Physical Training Class at the Alexandra Palace, the Club set out to investigate the possibility of floodlighted training under playing conditions on its own ground.

The Tottenham and District Gas Company, which has for some years past given very efficient service to the Club for lighting, heating, and cooking, was approached to see whether it would co-operate in experiments with gas floodlighting units. The Company loaned four units to the Club, and Mr. Cocks, the Inspector at the Winchmore Hill Depôt, and Mr. J. Murray Grammar, representing the Saracens, conducted experiments on four evenings.

Wednesday week saw the first official training evening when two teams were able to play between the 25 yd. lines and over the full width of the 1st XV pitch, representing an area equal to two-thirds of the normal field of play. For scrummage practice, dribbling, "lines out," and even passing movements the ball was easily seen; in fact, for all departments of the game except "long kicking" good playing conditions were reproduced.

The Saracens have now signed a hire contract with the Tottenham and District Gas Company for the use of the lamps for the rest of the season and have ordered a permanent gas supply for them to be installed. The units are Kempton 12-light "Kempar" flood lanterns, the 12 mantles being in a single line with highly polished reflectors behind them, and are fitted on poles some 12 ft. from the ground. The units are similar to those used in St. James's Park for the Coronation Floodlighting. This, we believe, is the first time that gas has been used for floodlighting a rugby football pitch, and the improvement on conditions obtained with acetylene flares, commonly used for after-dark training, is most noticeable. Particularly so is the improvement apparent is greater visibility and the absence of acetylene fumes; one can readily imagine the discomfort caused by running into a "pocket" of these fumes when one is "all-in" at the end of a hard spell of training.

A generous testimonial to the new floodlighting appeared in the "Notes and News" column of the Club's programme for Feb. 19. It ran as follows: "Judging by the rumours which have passed through Southgate and its neighbourhood during the past two weeks one would judge that Firs Farm (the Club's ground) was haunted. There is, however, some truth in the tale that disembodied spirits have been seen playing a ghostly game of rugby football on this stretch of turf, uttering weird and ghoulish cries as they run and tackle one another. The spirits, however, have been far from disembodied, for, with Nobby Bartlett tooting the whistle, Saracens have been indulging in football by floodlight. Thanks to the skill of the technical staff of the Tottenham Gas Company and Mr. Murray Grammar, the experimental stages are now over and the ground at Firs Farm is floodlighted once a week so as to enable players to obtain that spot of practice that is so much wanted. Any who are sceptical or who doubt the powers of gas lighting will be well advised to visit the ground next Thursday or subsequent Wednesday evenings, and we are sure that they will join with us in congratulating Tottenham Gas on a first-class job."

Forthcoming Engagements

March

1-3.—**Joint Gas Conference** at the B.I.F.
3.—**Midland Juniors.**—Meeting and Paper by D. J. Ward on "M.A.N." Holder Tar Re-conditioning Plant."
4.—**I.G.E.**—Research Executive Committee, 2.30 p.m.
5.—**Scottish Juniors.**—Joint Meeting at Edinburgh. Paper by Col. W. Carmichael Peebles on "Governors."
5.—**Manchester and District Juniors and Yorkshire Juniors.**—Joint Visit to W. C. Holmes & Co., Ltd., Huddersfield. Paper by E. B Craddock on "Organizing an Industrial Gas Department at Stockport."
7.—**I.G.E.**—Finance Committee, 1.45 p.m.; Membership Committee, 2.15 p.m.; General Purposes Committee, 3 p.m.
8.—**I.G.E.**—Council, 10 a.m.
8.—**N.G.C.**—Central Executive Board Meeting, 2.30 p.m.
9.—**I.G.E.**—Board of Examiners, 10.30 a.m.
12.—**Scottish Juniors.**—Joint Visit to Works and Showrooms at Alloa.
14.—**L.C.C.A.**—Technical Committee, 2.30 p.m.
15.—**I.G.E.**—Gas Education Executive Committee, 2.30 p.m.
15.—**London and Southern Juniors.**—Meeting and Paper by C. H. Ward on "Coke Conveyors."
16.—**B.C.G.A.**—Executive Committee Meeting, 11.30 a.m.
17.—**I.G.E.**—Refractory Materials Joint Committee, 2.30 p.m.
17.—**Southern Association (Western District).**—Commercial Meeting, Rougement Hotel, Exeter, 2.30 p.m.
18.—**Manchester Association.**—Annual Meeting, Midland Hotel, Manchester. Presidential Address of E. Astbury.
19.—**Wales and Mon. Juniors.**—Visit to Neath.
21.—**L.C.C.A.**—Finance Committee, 10.45 a.m.; Executive Committee, 11.15 a.m.; Central Committee, 2.30 p.m.
23.—**London and Southern Juniors.**—Visit to G. A. Harvey & Co., Greenwich Metal Works.
25.—**Southern Association.**—Annual General Meeting, Hotel Victoria, W.C. 2, 2.30 p.m.
26.—**Western Juniors.**—Visit to Bridgwater. Question Box.
26.—**Yorkshire Juniors.**—Meeting at Bradford. Paper by A. Pickard on "The Technical Control of a Small Undertaking."
26.—**Scottish Western Juniors.**—Annual Busineess Meeting at Glasgow Corporation Lighting Department. Paper by W. Rae, of Electrolux, Ltd., on "Domestic Refrigeration."
29.—**Gas Coke Export Association.**—Committee Meeting, 11 a.m.; Annual General Meeting, 12.15 p.m., at Gas Industry House.
29.—**Southern Association (Eastern District).**—Meeting at Gas Industry House, 2.30 p.m.
31.—**S.B.G.I.**—Council Meeting, 2.30 p.m.

April

1.—**I.G.E.**—Liquor Effluents and Ammonia Committee, 11.15 a.m.; Joint Research Committee, 2.30 p.m.
2.—**Scottish Eastern Juniors.**—Visit to Aitken Colliery. Paper by G. Jenkins on "Coal Analysis."
7.—**I.G.E.**—Joint Committee on Complete Gasification under Pressure, Fuel Research Station, S.E. 10, 11 a.m.
7.—**Midland Juniors.**—Meeting and Paper by W. L. Howe, of Nottingham, on "Gas and Filtration and Heating of Swimming Pools."
8.—**North British Association.**—Spring Meeting at Coatbridge.
9.—**Manchester and District Juniors.**—Annual Dinner. Paper by W. Hodkinson on "Technical Work in a Holding Company."
23.—**Western Juniors.**—Annual Meeting at Swindon. Presidential Address by J. E. Akroyd.
23.—**Midland Juniors.**—Visit to Central Laboratories and Automatic Water Gas Plant, Nechells Gas-Works, Birmingham.
23.—**Yorkshire Juniors.**—Meeting at Leeds. Paper by G. F. Murray, of Sheffield, on "Water Heating by Gas."

The "JOURNAL" Stand

Further News from the British Industries Fair

Our Special Representative Notes Items of Interest in London and Birmingham Sections ‖ **Official Visits of the Junior Gas Associations and Salesmen's Circles**

Modern Meters

A number of interesting meters and meter accessories are to be seen on the stand of Thomas Glover & Co., Ltd. Among these is a large industrial meter, having a rated capacity of 25,000 cu.ft. per hour, which is fully lubricated by a mechanically-operated device, fed from an external reservoir.

The increase in the speed of the meter and the general tendency to supply dry gas has led designers to give the lubrication of the moving parts their serious consideration. Thomas Glover have recently perfected a complete oiling system for large meters, which provides for the continuous lubrication of the moving parts, including the valve surfaces. In operation, the device is automatic in its action, the supply of oil being regulated by the speed of the meter. The reservoir which contains the lubricant is attached to the outside of the meter case and is easily refilled to the correct level through an inspection cover. This reservoir is of ample capacity, and when filled is sufficient to keep the meter lubricated over a long period without further attention.

Another interesting device on Thomas Glover's stand is the "Tottenham" Maximum Demand Recorder, which was designed at the request of the Tottenham and District Gas Company, who have instituted a two-part tariff for their industrial gas consumers comprising:

(1) A maximum demand charge, dependent upon the maximum consumption in any one day of 24 hours during the year.
(2) A commodity charge for all the gas consumed as registered on the main meter.

The maximum Demand Recorder is operated by the meter in conjunction with a clock controller. The action of the meter is used to convey motion to the recorder mechanism which controls the rate of travel of a paper chart, and the clock controller is arranged to operate a punch which can be set to come into action once in 24 hours or at any other desired period.

If it is set to come into action once every 24 hours, the distance between any two punched holes on the chart will represent the total consumption during that period. Normally a chart will last 14 days and the maximum 24-hour consumption during that period can be quickly ascertained by inspection. By means of the record provided, a two-part charge designed to meet local requirements can be calculated on the basis of the maximum day's consumption in any year or any part of a year.

Tariff schemes, whereby gas is charged at a reduced price if consumed during certain hours, figure prominently among the many inducements offered as a means of increasing the use of gas for domestic and industrial purposes. Meters can be adapted for these schemes by the fairly simple method of fitting an index which will not only record the total volume of gas, but will also show what proportion has been passed during any predetermined period.

An improved index of this type has been designed in Thomas Glover's Technical Department. It provides for the separate registration of the gas consumed during any specified time of the day or night, and is conveniently arranged in two sections, one above the other. The top section indicates the total number of cubic feet passed and the lower that proportion which has been used during the predetermined period and is chargeable at the preferential rate. This lower section is put into operation by means of a clutch, actuated by a clock controller which has been previously set for the required time.

The "Gasclock" is a prepayment device which has been designed by Thomas Glover to control the use of gas fires through the medium of a time clock and a sixpenny piece. It cannot be adapted for use with any larger coin as it has been designed to meet the demand for a neat and compact unit. It will go into a space only 4 in. square. The clock is controlled by the gas tap. An ingenious piece of mechanism starts and stops the clock when the tap is turned on or off. The clock cannot "run down," as the coin opens the gas valve and winds the clock for a period which corresponds to the "set" or length of time indicated by the unused gas dial. The charge for the use of the fire can be varied between 1 and 4 hours for sixpence by suitably adjusting the "set" of the coin slot. Any unexpired period may be cancelled by operating the reset lever which is concealed in the cash box. The "Gasclock" forms a particularly cheap and attractive installation for hotels when used in combination with portable types of gas fire.

The B.G.F. Information Bureau

Technical Exhibits by the Parkinson Stove Company

A series of particularly interesting technical exhibits are to be seen on the stand of the Parkinson Stove Company. These not only show some of the latest developments of the firm but also some of the methods whereby they test their products to ensure satisfaction to the customer. We give below a brief account of their technical exhibits:

Salt Spray.—This consists of a Monel metal welded tank with a sump containing 5% solution of common salt which is circulated as a fine mist by means of compressed air. The parts to be tested may be suspended on a rack or on fine wires if necessary. This method serves as a rapid indication of the resistance of various finishes such as chrome or nickel plate, paint, &c. This test is arbitrary, but serves to give a basis for comparison between the same type of coatings of different qualities.

Aeration Test Burner.—It is now well known that two gases of similar calorific value may have very different combustion characteristics, and an aeration test burner is on view operating with different gases, and which indicates clearly the nature of flame changes to be expected.

The burner consists of a water cooled head, a graduated air shutter, and a governed gas inlet. Behind the burner head is fitted an engraved glass mirror scale from which it is easily possible to estimate the length of the blue inner cone. Since the gas pressure and orifice size is fixed, gases with a different calorific value or specific gravity will require different air shutter openings to produce equal cone lengths. The degree to which the shutter is opened gives the arbitrary figure known as the A.T.B. No. It

is possible to increase the A.T.B. No. by the addition of methane or butane in small quantities, and the change in cone height gives an excellent illustration of the changes to be expected on the district.

Tap Tester.—This tester has been designed to test taps with any degree of rotation from 90°-180°. This is obtained by fitting a slow motion gear to an electric motor and connecting this to a reciprocating gear with a sliding pivot, the position of which can be altered to suit the degree of rotation required. Each test spindle is connected through a universal joint and spring clutch to the tap to be tested. The spring clutch can be set to throw off at any desired load. A revolution counter is also fitted to each point to indicate how many reversals have been required before the tap seizes or becomes too stiff to operate under a given turning force.

Directional Heat Radiation.—A thermopile is mounted on a fixed block and may be rotated to point first at a "Ubic" radiator and then at a "Cabinette" radiator. The relative heat intensity from each of these radiators is indicated on a galvanometer.

This demonstration indicates in a simple manner the difference between the heat radiated by a "Ubic" radiator as compared with a radiator of the ordinary pattern. At the outset it should be emphasized that the total heat emitted from both these heaters is identical in quantity, but, whereas the "Cabinette" type radiates equally all round, the "Ubic" radiator confines its heat output to a limited angle. A comparison of the readings given when the thermopile is turned first from the "Ubic" to the "Cabinette" indicates that the "Ubic" is radiating approximately ten times more heat than the "Cabinette" in a forward direction.

Flow Test Apparatus.—This apparatus is designed for all measurements involving the determination of a gas rate at a given pressure, including such items as:

(*a*) The testing of governors.
(*b*) Determination of pressure loss in various fittings.
(*c*) Calibration of injectors.

A Rotaregulator is employed for gas rates up to 60 cu.ft./hour and a venturi meter for gas rates up to 300 cu.ft./hour. Control of the gas rate can be made by a needle valve. Air is used instead of gas and the readings are corrected to correspond to gas of an average specific gravity.

Parkinson Sink Heater.—This exhibit shows a sectional working model of the No. 81 heater, together with a standard working model. The model shows the operation of the valve and the lighting of the burner, and the pressure gauges show the suction developed in the valve, and dial thermometers show the difference in water temperature obtained from the standard working model.

Design and Construction of Burners.—A hotplate is shown in which one burner has been made "self-righting" by using a small diameter venturi mixing tube and a splayed stream obtained by means of a helical gasway immediately behind the gas jet. Another burner on the hotplate is drilled with very small diameter ports in order to illustrate that this point governs the tendency to lighting back much more than the design of the mixing tube. Other forms of splayed gas stream are exhibited separately.

Carbon Monoxide Test Apparatus.—(*a*) A simplified method using a dilute solution of palladium chloride. This method depends upon the reduction of palladium chloride to metallic palladium by carbon monoxide. An aspirator is used to draw a sample of the products of combustion through a purifying train of U tubes filled with Sofnolite and the purified sample is then drawn through a solution of palladium chloride—1 in 1,000; this method will detect 0·02% of carbon monoxide.

(*b*) A compact form of iodine pentoxide train for more accurate estimations is also exhibited. A sample of gas is bubbled through the chromic acid solution to remove sulphur and oxides of nitrogen, followed by crushed marble to remove acid spray, and magnesium perchlorate as a drying agent. The gas then passes through heated tubes containing iodine pentoxide, where carbon monoxide is oxidized to carbon dioxide releasing free iodine, which is adsorbed in washers containing potassium iodide solution. The iodine may then be estimated by titration with sodium thiosulphate.

Expansion Apparatus.—The correct operation of an oven thermostat depends upon the differential expansion of brass and a 36% nickel/iron alloy. This apparatus serves to test the coefficients of expansion of 12 in. specimens. The specimens are mounted in a tube of fused quartz which has a coefficient of expansion of $0{\cdot}5 \times 10^{-6}$ per degree Centigrade. The specimen is spaced from each end of the quartz tube by two transparent quartz rods. At the head of the main tube is mounted a micrometer reading to 1/10,000th part of an inch. The head is fitted with a spring mounting so that no damage will occur should the specimen be permitted to expand without having first withdrawn the micrometer head.

The quartz tube is fitted inside an electric wire wound furnace; the temperature gradient is reduced to a minimum by winding on an insulated aluminium tube which fits over the main quartz tube. Three thermocouples are incorporated in the tube assembly, which register the average temperature over the length of the specimen. These are connected to a common negative cold junction and thence through a switch and galvanometer, so that the temperatures at each point can be measured independently.

An Original Ascot Display

The two-storey stand of Ascot Gas Water Heaters, Ltd., is further evidence of the originality for which this firm is noted.

It was decided this year to incorporate an effective demonstration of the "Ascot" boiling water appliance on the upper floor in the form of a "Tea Garden," thereby providing additional space and more privacy. The result is an unusually interesting view of the Exhibition. There were certain difficulties in complying with the standard regulations of the Exhibition with regard to height and zoning, and the three flue fins on the first floor were originally designed to have a canopy. This, however, was not allowed by the Authorities.

As all the "Ascot" heaters are shown working, this necessitated the central hollow fin structure to incorporate the great amount of plumbing and flues for the large heaters. Where possible seating accommodation was incorporated with pamphlet counters within easy access of the gangways. A small lake in the front of the stand was designed as a novel way of demonstrating the smaller heaters, with a small fountain at one end supplied from the new "Ascot" multi-point (Type CA.65 M.1) which is designed to serve shower baths and give a large output of hot water.

Two staircases were constructed, one at the front and one at the back of the stand to give easy access to the Tea Bar. The roof was of exceptionally solid construction in order to carry the weight likely to be imposed upon it, while the whole of the

ground floor ceiling had to be treated with fireproof asbestos. The lighting of the stand was provided by a series of gas floods equally distributed over the area of the stand high enough above the Tea Garden to avoid glare; additional illumination was incorporated in the ceiling to give more concentrated lighting on the appliances on the ground floor.

The lake was built up of timber with hollow sides to take the plumbing supplies to the small sink heaters and boiling water appliances and was covered with asphalt painted with a special paint. At the opposite end of the stand which is devoted mainly to technical matters there is a special stainless steel trough for further working appliances.

Instead of the usual signwriting which is necessary but always constitutes a problem with a stand of this nature, it was decided this year to use pin-on metal lettering standing slightly away from the wall, giving an exceptionally neat appearance to the descriptions.

There are working models of "Ascot" multi-point water heaters. An improved bath water heater (Type SG.32) and a new multi-point (Type CA.65 M.1) were also shown working. Of special interest to engineers is a sectional working model of the multi-point (Type NEA.32) and a sectional model of a house showing the multi-point installed as an alternative to a coke-fired boiler. "Ascot" volume governors, automatic valves, descaling plant, and other components of these water heaters are attractively displayed at the back of the stand, many of the parts being in section for detailed examination.

Jointing Materials and Plastic Packing

A number of useful products for various gas-works purposes are displayed on the stand of Grant & West, Ltd., of 3, Furlong Road, London, N. 17. Among these is "Selek"—a metal-to-metal jointing material in powder form. Such joints, the makers claim,

cannot be blown out by pressure, burned out by temperature, or affected by the solvent action of any coal tar or crude oil distillates. "Selek" can be used for all purposes and becomes part of the job itself, yet is easily broken down again when desired.

Another product displayed by this firm is their "Plastiloy" plastic metallic packing. This is an all-purpose packing in which are united the advantages of soft rope and metallic packings. It will fit glands of all sizes, and instead of each gland requiring its own particular size of packing, "Plastiloy" provides a material for every gland on the plant. It is—as its name implies—a metallic packing in plastic form and comprises a properly balanced combination of anti-frictionals, lubricants, and binders, designed to stand up to any temperature, fluid, or gas. Briefly, this material is self-lubricating, fits scored rods perfectly, and because it is anti-frictional it will not mark the rod. It makes leak-tight and lasting joints under all conditions; it does not harden, and can be depended upon for long service.

Another product of this firm is "Cretex"—a bituminous material for damp walls and leaky roofs. While ordinary bitumen requires to be heated before application, "Cretex" can be applied straight from the drum; it spreads easily and sets in a few hours to a rubber-like condition which is impervious to water. The material can be supplied in colours no less waterproof than black, so that colour finishes can be rendered waterproof without detracting from appearance.

Messrs. Grant & West also manufacture a portable vice-holder which should be valuable for gas fitters and others. It can be fixed between any door posts or window frames, or between the walls of a passage in a matter of seconds, while it is light in weight and can be dismantled into a small compass which is easy to carry from place to place. There can be no damage to door or window frames, as the end plates of the vice-holder are protected with rubber pads. This firm also manufacture "Ropres"—a preservative for steel wire ropes and cables—and a non-inflammable, non-poisonous, plastic jointing compound for water, gas, or steam. Being free from lead, graphite, and manganese, it does not taint the water.

Colourful Display by Donald Macpherson & Co., Ltd.

An Automatic Gas Tap

Many visitors to the Birmingham Section of the Fair will have seen on the stand of Safety Gas Devices, Ltd., of 52, Ludgate Hill, E.C. 4, demonstrations of the "Ketral" automatic gas tap. This appears to be a very interesting proposition, which, it is claimed, could be fitted to all gas appliances, new or old, to eliminate wastage and the possibility of danger from escaping gas.

The principal features are as follows: The simple operation of opening the tap not only turns on the flow of gas, but also automatically ignites the pilot and burner by means of a flint device. If for any reason the flame is extinguished—for instance, through the slot meter supply ceasing, draught, or the boiling over of liquids—either the gas is automatically re-lighted from the pilot which controls the bi-metallic strip, or, if the pilot too has become extinguished the bi-metallic strip automatically causes the tap to turn off after an interval of about 20 seconds. It is impossible for the tap to remain open, or even partially open, if the gas is not ignited. The pilot flame is only burning so long as the appliance is alight.

Fitted to instantaneous water heaters the "Ketral" is demonstrated fulfilling a variety of functions. It first turns on the water feed; it opens the gas supply; it lights the pilot flame (which lights the burner), and it connects the safety mechanism which automatically turns off the tap should the gas flame be extinguished. With this tap it is claimed to be impossible to heat a geyser through which no water is passing—and thus it incorporates tap and safety cut-off in a single mechanism. At the same time, it enables cold water to be drawn through the appliance if desired.

The tap is of sound construction, and the mechanism is enclosed in a casing which protects it from grease and dirt, rendering it neat, compact, and practically indestructible. The replacement of the flint is also a very simple operation.

The London Section

Gas Light and Coke Company

The Gas Light and Coke Company's exhibit at the London Section of the B.I.F. consists of about 40 specimens of their range of tar, ammonia, and cyanogen products.

Chief among these are creosote for wood preservation and hydrogenation purposes, pitch for briquetting and various manufacturing purposes, tars for all forms of road work, including surface spraying, tarmacadam manufacture, and the preparation of thin tar carpets. "Brotox"—non-toxic tar for use on roads in the vicinity of fishing streams, and "Becmulse," a tar emulsion for cold use, are also featured. Tar spirits shown include benzoles, toluoles, solvent naphthas, xyloles, and heavy naphtha.

Crystal phenol for use in the synthetic resin industry, and cresylic acids are of particular interest. The cresylics are of 99½% purity, and of excellent colour-keeping qualities. High ortho and high meta grades are shown. Naphthalenes range from drained, whizzed, and pressed crudes to purified crystal, powder, ball, and flake forms. Pyridines cover 90/180, 90/160, and 90/140 grades, and pure qualities of narrow boiling ranges.

Ammonia products include sulphate of ammonia, the well-known fertilizer, and liquid ammonia for industrial purposes.

Colour is lent to the exhibit by the display of cyanogen products, including prussiate of potash and a range of bronze blues. Among other products are sulphuric acid and green copperas, produced by the Company, and employed in their own processes.

South Metropolitan Gas Company

The South Metropolitan Gas Company's Products Department is represented by displays of "Metro" coal tar and ammonia products. Visitors will notice, too, the modern gas lighting in and around the "Metro" exhibit which helps to draw attention to the display.

"Metro" road tar is a product to which a considerable amount of research has been devoted for some years. Experimental work both in the "Metro" laboratories and on the roads is progressive and continuous, and it is now possible to supply suitable grades of tar to meet all local conditions where it is to be used, including that so necessary for summer treatment of main roads. Whether for surfacing, tarmacadam, and grouting, carefully prepared road tars bearing the "Metro" signature are not only British made, but are economical, hard wearing, and provide a non-skid surface.

Other "Metro" chemical products include the beautifully crystalline dry neutral sulphate of ammonia. "Metro" sulphate of ammonia, which can be stored for long periods without changing its condition or affecting the sacks in which it is held. Its content of as much as 25·71% ammonia—equal to 21·14% nitrogen—is a further recommendation when concentrated fertilization is taken into account.

"Metro" disinfectant fluid for general purposes now has an increased Rideal-Walker coefficient of 11 at no increase in price. "Metrotect," for protective treatment of outdoor ironwork, is a bituminous paint easy to apply and flows very readily under the brush, does not crocodile even in the most exposed positions, and has exceptional anti-corrosive and waterproof properties. "Metro" creosote is ideal for preserving outdoor woodwork—either by direct application in the cold state or by impregnation under heat and pressure. Other products comprise solid smokeless fuels for domestic fireplaces and hot-water installations, motor benzole, anthracene, sharp oil, pyridine, sulphuric acid, sulphate of iron, coal tar pitch, &c.

Noiseless Typewriters

The latest designs of noiseless typewriters are shown on the stand of the Remington Typewriter Company, Ltd. It is claimed by the makers—not without justification—that more and better work can be performed with a noiseless machine, not only by the operator but by all those within earshot. In addition, valuable office space is saved, because machines may be placed close to executive or clerical desks.

An interesting experiment was carried out to test the noiselessness of the Remington machine. Two typewriters were placed before a microphone in rotation. One was a Remington noiseless, the other an ordinary noisy machine. Attached to the microphone was an instrument called a visual indicator—a device which actually measures noise. The noisy typewriter had to be moved 22 ft. away from the microphone to produce the same low level of sound as the Remington noiseless at a distance of only 1 ft.

Official Visits

Juniors' Day.

On Thursday, Feb. 24, members of the British Junior Gas Associations to the number of several hundreds visited the Castle Bromwich Section and were entertained at lunch by the Fair Management Committee—Col. O. B. F. PLANCK, D.S.O., T.D., D.L., presiding.

In proposing the Toast of "The Gas Industry," Col. Planck said it was his great privilege to welcome the Juniors there that day on behalf of the Fair Management Committee. They were additionally honoured by the presence of Mr. H. C. Smith (President of The Institution of Gas Engineers) and Mr. A. W. Smith and Mr. G. C. Pearson (respectively General Manager and Secretary and Engineer-in-Chief of the Birmingham Gas Department). He also welcomed Mr. R. N. LeFevre (Chairman of the Joint Junior Council and President of the London and Southern Association). The presence on that occasion of leaders of their Industry, said Col. Planck, paid tribute to the high regard in which the Junior Associations were held in the Industry. Furthermore, they were very pleased indeed to have with them Herr A. Adam (Chief Engineer and Manager of the Industrial Laboratories of the Dutch Gas Association).

The Gas Section at the Fair, continued the Chairman, was produced, it must be remembered, by the joint efforts of the members of the British Gas Federation, of which the members of the Society of British Gas Industries played an important part in planning the Section for months beforehand, with the result that the varied interests within the Gas Industry were united in trying to present the best possible show. In that connexion, the members of the Committee desired to pay tribute to the work of the Hon. Secretary, Mr. W. L. S. Spinks. The objects of this Gas Section were two-fold—first, it was designed to enhance the prestige of and obtain the best possible publicity for the Industry; secondly, it provided the opportunity for those there on that occasion to see the most recent designs, to appreciate the latest developments, and, generally, to be kept up-to-date in connexion with the plant and equipment which was used in the Gas Industry. In Col. Planck's opinion the Gas Industry had never been so efficient or had such wonderful prospects as it had at the present time, and it had been the aim of those responsible for the Gas Section to produce a display which would be worthy of the Industry. It was for them to judge whether that object had been achieved.

He understood that representatives of 150 gas undertakings were there that day—which was a matter for great congratulation. In conclusion, he gave them the Toast of "The Gas Industry," coupled with the name of the President of The Institution of Gas Engineers.

Mr. H. C. SMITH, responding to the Toast, remarked that Col. Planck had said many nice things about the Gas Industry—all of which were deserved—and it might be mentioned that Col. Planck was himself a member of the Industry. It gave Mr. Smith great pleasure and he felt highly honoured to be asked to reply on behalf of the Gas Industry, particularly as that part of the Industry represented there that day formed the Junior Associations. No one appreciated more than he did the work of the Juniors. It was not so very many years ago that he was a Junior himself, and he still had a great affection for the Junior Associations. In addition to the large number there that day, Mr. Smith reminded them that there would be many more official visits from members of the Gas Industry during the Fair—including representatives of that most important side—the workers. A few years ago there was no Gas Section—and the Fair was a very different place; he was glad the Section was back again now. They were a very united Industry; they all worked with two ends in view—namely, to deal in the most economical possible way with the country's greatest national asset—coal—and to provide the citizens with the means of lighting and heating in the most efficient and convenient form. Those were two very high ideals.

The Toast of "The Gas Industry" had been proposed for 120 years, said Mr. Smith, and it was increasingly difficult to find anything new to say, but on this occasion there was no need to say anything further, because just outside that room there was sufficient ocular demonstration of what it could do. Finally, he expressed sincere appreciation to the Fair Management Committee for their hospitality and to Col. Planck for presiding.

Salesmen at the Fair

An excellent attendance marked the visit of members of the B.C.G.A. Salesmen's Circles to the Fair on Friday, when they were entertained at luncheon on the kind invitation of the Fair Management Committee. The Chair was taken by the Vice-President of the Birmingham Chamber of Commerce, Mr. John H. Allen, J.P., who proposed the toast of "The Gas Industry."

After referring to the excellent support accorded the Fair by Gas Industry salesmen, Mr. Allen went on to call attention to the importance of the salesman's sphere of influence in the Industry; even the manufacturers could profit, he asserted, from the advice of the salesman. Regarding the Gas Section, he observed that the Fair Management Committee were very proud indeed of the Industry's display. The manufacturers had risen to the occasion and had staged a display which was worthy of the position which the Industry occupied both at the Fair and in the country. This year's Fair was undoubtedly the best they had ever staged and much of the credit for this was due to the B.C.G.A. In conclusion, Mr. Allen said the Gas Industry was of the greatest importance to-day and the portents indicated that it would be of even greater importance in the future.

In reply, Mr. R. W. Lowman, Sales Manager of the Gas Light and Coke Company, said that they had to present their story and their goods properly to the public. They had to examine their own organizations and see that they were efficiently managed, so that the cost of the service they gave was competitive. Their story and their service, excellent though they were, would not achieve proper results unless they could be shown to be economic. He did not mean that they had to sell gas at the price of raw coal, but they had to sell gas service at a price which was competitive with the service given by other fuels. It was fair to credit themselves with labour. The utilization of gas did mean that certain labour was saved, but in far too many cases to-day did they ask to be credited with too large an amount as the cost of the service that they gave with their products. The position was being rapidly overcome by means of tariffs, and the whole question of tariffs was worth the immediate consideration of all constituents of the Industry. He recognized that a common tariff, or possibly a common form of tariff, was impossible, but he did believe that if all undertakings would examine their financial structure and enlist the advice of competent accountants, some form of promotional tariff could be adopted by each. In his Company an immense amount of time and effort had been devoted to this problem, and in London to-day the ordinary domestic consumer could, be he rich or poor, have his smokeless home and all the benefits associated with the use of gas at a price which was well within his means, and differed very little from the total cost of the crudest fuel. He would like to mention particularly Kensal House, which had been their contribution to the housing of the poor, which was so much in the minds of everyone to-day.

Another factor in the proper presentation of their story and goods was the strength that was associated with unity. Much had been done through our national organizations, among which he would particularly mention the B.C.G.A., to present a united story to our public. Much, however, still remained to be done, and he stressed the necessity of each one of them to sacrifice, if needs be, some of their cherished ideas and their particular methods of working, for the common good. Our organization to-day needed to have not only a common goal but a common voice. This added strength to any appeal that they made to the public, and enabled that appeal to be made economically. Probably a first step in planning the progress of our Industry throughout the country must be to develop it regionally, and this was already being done in London and in other centres.

This progress which he had visualized needed organization, unity of thought, unity of effort, but plans would not be effective if they as salesmen did not contribute their bit.

Theirs was an important task. The Industry depended upon them in their contact with the public to express in a way that could not be expressed in any other way the service that they of thought, unity of effort, but plans would not be effective were in a position to render. A salesman needed to have three things: A good product to sell; a complete knowledge of his product and the ability to pass on this knowledge; and real understanding of the other fellow's point of view.

Had they all, he asked, that knowledge of their product that they should have? He was certain they had all got confidence in it, but that confidence was of little use without complete knowledge, and certainly they could not pass their story on to the public without a complete understanding and a complete knowledge of what they had got to sell. There were ways and means, however, to-day of acquiring knowledge, and he was certain that they were all given the opportunity in their undertakings of learning. Regarding the ability to understand the other man's point of view, he observed that they needed it particularly because they were not selling a specific article, but the means of using gas service. That service was wide in its ramifications and it was necessary to understand what the customer was going to demand from them for that service to be given well and efficiently.

"You will remember that you have a task which is not the lot of all salesmen," Mr. Lowman concluded. "You need to be advisers as well as salesmen, advisers in the use of what we think is a service which should be of real benefit, but only if it is correctly advised."

Women's Gas Council

Members of the Women's Gas Council from various branches paid an official visit to the Birmingham Section of the Fair on Monday, Feb. 28.

Metropolitan and Suburban Companies' Results in 1937

A comparative statement of working results and revenue account costs per therm sold.

Compiled by E. COWEE, Accountant to the Commercial Gas Company

	Gas Light	So. Metrop.	Commercial	S. Suburban	Wandsworth	Tottenham	Croydon	Lea Bridge	Hornsey
Declared Calorific Value ... ... (B.Th.U.)	500	560	500	560	500	500	500	500	500
Gas Sold on Declared Calorific Value ... (therms)	270,979,920	79,489,957*e*	15,582,795	26,751,444	32,609,104	22,407,475	16,422,891	5,523,975	4,056,370
Increase on Gas charged to consumers ... (per cent.)	1·32*a*	*Dec.* 3·94*a*	*Dec.* 3·14	·26	1·56	2·07	·06	1·57	*Dec.* 1·22
Gas made per ton Coal on Works Tests (therms)	75·48*b*	74·91	72·70*b*	73·36	76·03*b*	77·70*b*	77·35*b*	80·80	67·37*b*
,, unaccounted for ... ... (per cent.)	3·69	.01	3·33	5·72	4·74	6·45	6·08	4·10	2·28
Coke made for Sale per ton Coal ... ...(cwts.)	10·12	9·67	9·94	10·68	9·07	9·06	10·12	10·04	11·05
Tar made per ton Coal ... ...(galls.)	10·25	10·57	10·23	9·95	10·43	12·47	12·15	15·94	10·03
Liquor made per ton Coal ... (galls.—8 oz.)	35·84	40·68	36·25	33·29	25·39	26·53	40·97	41·41	32·53
Percentage of Coke used as Fuel	19·08	18·93	23·52	19·80	26·35	25·19	18·03	22·39	15·00
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
CAPITAL EXPENDED (less nominal additions) per therm sold	2 0·42	1 10·66*f*	2 1·95	2 6·38	2 6·96	1 9·46*h*	2 3·98	1 9·93	2 0·15
CAPITAL EMPLOYED per therm sold	3 5·91	2 7·85*f*	3 8·63	3 2·14	3 6·08	2 1·75*h*	2 10·12	2 2·82	2 7·07
	d. d.	d. d.	d. d.	d. d.	d. d.	d. d.	d. d.	d. d.	d. d.
Price of gas per therm in principal area ... ... { *L*'day, Mid. ...	8·7 8·7	9 9	9·00 9·25	9·5 9·5	8·2 8·2	8·6 8·6	9·1 9·1	8·4 8·4	8 8
Miehs, Xmas ...	8·7 8·7	9 9	9·25 9·25	9·5 9·5	8·2 8·2	8·6 8·6	9·1 9·1	8·4 8·4	8 8
COSTS PER THERM SOLD.									
Revenue Accounts.	d.	d.	d.	d.	d.	d.	d.	d.	d.
Coals, Oil, etc.	3·44	3·41	3·87	4·34	3·71	4·10	4·05	3·92	5·03
Less Residuals :—Coke and Breeze	1·09	1·95	2·32	2·19	2·00	2·10	2·15	1·91	2·74
Tar ... ... ,,	·46	·44	·52	·33	·46	·78	·54	·50	·58
Amm. Liq. and S. of Amm.	·01	·08	·08	—	*Dr.* ·02	·07	·03	·01	·04
TOTAL RESIDUALS ...	2·46	2·47	2·92	2·52	2·44	2·95	2·72	2·42	3·36
Net for Coals, Oil, etc. ...	·98	·94	·95	1·82	1·27	1·15	1·33	1·50	1·67
MANUFACTURE—									
Salaries	·15	·25	·23	·18	·17	·21	·19	·09	·16
Wages—Carbonizing	·32	·51	·61	·42	·46	·38	·29	·42	·45
Purification	·06	·17	·11	·09	·10	·10	·05	·04	·10
Repairs : Plant ... ... ,,	1·27	1·35	1·12	1·23	1·49	1·63	1·17	1·35	1·17
Net Manufacture ...	2·78	3·22	3·02	3·74	3·49	3·47	3·03	3·40	3·55
DISTRIBUTION—									
Wages and Salaries	·80	·45	·47	·89	·50	·44	·60	·16	·32
Repairs—Mains and Services, etc.	1·17	·71	·50	·91	·61	1·75	1·01	·55	·51
,, Meters and Prep. Meters and Fittings	·44	·74	·79	·91	1·07	·52	·44	·44	·57
,, Stoves—Ordinary and Prep.	·97	1·04	1·24	1·00	·61	·48	·78	1·32	·39
TOTAL—Net Manufacture and Distribution ...	6·16	6·16	6·02	7·45	6·28	6·66	5·86	5·87	5·34
Rents, Rates and Taxes	·51	·35	·37	·33	·28	·45	·76	·54	·37
MANAGEMENT—									
Directors, Auditors, and Salaries (Secretary, etc.)	·11	·18	·18	·19	·18	·15	·21	·21	·37
Collectors	·19	·17	·26	·13	·12	·20	·27	·14	·08
Stationery and General Charges	·16	·21	·21	·18	·23	·21	·30	·30	·31
Copartnership	·11	·10	—	·14	·20	·19	·21	·16	·15
Bad Debts	·01	·02	·01	·04	·07	·01	·00	·01	·06
Law and Parliamentary Charges	·01	·01	·00	·01	·02	·01	·00	·01	·01
Superannuations, Pension Funds, etc.	·27	·17	·32	·32	·24	·19	·44	·27	·49
National Insurance	·08	·26 *g*	·08	·07	·08	·09	·05	·06	·07
Sundries	·01	·01	·01	—	·01	—	·00	—	—
TOTAL EXPENDITURE (*less* Residuals)	7·62*c*	7·64	7·46	8·86	7·71	8·16	8·10	7·57	7·25
Gas (less Public Lighting Expenses)	7·69	7·98	8·01	8·94	8·19	8·06	8·81	7·68	7·66
Rentals—Meter and Prep. Meter and Fittings ...	·80	·68	·87	·84	·95	·55	·53	·47	·55
Stove ... ... ,,	·88	·64	·84	·96	·80	1·16	·74	·92	·30
Miscellaneous	·07	·03	·03	·02	·03	·02	·36	·01	·02
TOTAL—Gas, Rentals, etc.	9·44	9·33	9·45	10·76	9·77	9·79	10·44	9·08	8·53
Balance being Profit	1·82	1·69	1·99	1·90	2·06	1·63	2·34	1·51	1·29
Dividend and Interest	1·91	1·66	2·03	1·87	2·08	1·41	1·93	1·57	1·57
Surplus or Deficit	*Def.* ·09	·03	*Def.* ·04	·03	*Def.* ·02	·22	·41	*Def.* ·06	*Def.* ·28
Contributions to Funds and Sundry Payments ...	·04 *d*	—	—	·00	·01	·19	·37	·01	·15
Sundries.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Coals cost per ton	21 5·50	20 10·13	21 10·58	25 4·85	22 4·85	24 7·89	26 0·25	26 0·31	27 8·66
Coke realised per ton Coal	12 6·40	11 10·31	12 7·06	14 6·24	12 0·73	12 6·86	14 4·93	14 2·12	16 0·56
Coke ,, ,, Coke	24 9·12	25 3·39	25 11·40	26 10·02	26 7·17	27 3·36	28 5·91	28 2·88	29 0·53
Breeze ,, per ton	6 4·23	1 2·58	6 0·44	3 5·48	9 0·52	5 10·32	7 4·11	7 9·58	—
Tar ,, per gall.	3·61	3·04	3·48	2·69	3·29	4·62	3·59	2·71	4·02
Amm. Liquor, etc., realised per butt (8 oz.)	1·43	1 2·70	1 3·24	—	*Dr.* 7·92	1 9·55	5·39	2·87	8·62
Percentage of Stoves at Rental to Consumers ...	81	101	100	73	58	55	51	52	17
Bad Debts per cent. on Total Receipts	·13	·14	·08	·29	·55	·04	·03	·10	·46
Net Profit per cent. on Ordinary Capital	5·25	5·67	4·87	6·22	6·79	7·07	10·44	7·82	5·81
One fifth Penny variation on Gas charged to consumers equals Gross	£207,729	£64,287	£12,440	£21,631	£24,900	£18,673	£13,254	£4,603	£3,251
Water Gas per cent. on Total Make of cubic feet ...	11·70	—	·04	—	8·41	14·96	18·61	16·16	16·71

E. C.—21 2 38.

a—Excluding gas sold in bulk.

b—Before Benzol extraction.

c—Excluding expenses re issue of Stock and Leigh loans repaid.

d—Less Grant from Treasury.

e—Including Sales to South Suburban.

f—Eliminating purchase of South Suburban and Commercial Stocks.

g—Including Copartnership Insurance Fund.

h—Including Investments in other Gas Companies.

The Position of Benzole Recovery

Possibilities of Increased Home Production

A contributor examines statistically the present position of benzole recovery by the carbonizing industries. He concludes that they should show intensified activity in this direction, and should use, and strengthen wherever possible, their own selling organization in the national, as well as their own, interest.

Although the world's consumption of benzole for industrial purposes, as distinct from motor fuel, has remained comparatively steady at 30 to 40 million gallons per annum, or 15 to 20% of the total production, for the past few years, there has lately been a substantial rise in the demand for industrial spirit, while the automobile industry is insistent in its call for more benzole. From 3 to 8% of the motor spirit consumed to-day is the product of the coal carbonizing industries, ranging from 0·5% in the United States, where natural gasoline is plentiful, to about 16% in Germany, and the industry can absorb large additional quantities notwithstanding the growth of synthetic petrol production.

In their Paper before the Chemical Engineering Congress of the World Power Conference in London last year, W. G. Adam and G. W. Anderson, of the Gas Light and Coke Company, calculated the potential production of benzole in the different countries from which statistics are available, based on a yield of 2½ gallons of refined spirit per ton of coal carbonized, at about twice the present output.

There is a widespread feeling that both sections of the high-temperature carbonizing industries might do a great deal more than they are doing to-day to meet the demand for benzole. The argument applies with greater force to the gas-works than to the coke ovens, for on the basis of coal carbonized the undertakings at present taking benzole out of the gas represent less than half the total, whereas in the coking industry the percentage is of the order of 97·9.

The recently issued Annual Report of the Secretary for Mines, it is true, reveals a substantial increase in benzole production in 1936 over the previous year, but the fact remains that the combined output of refined spirit from gas-works and coke ovens, based on the amount of coal treated for the preparation of gas or coke, was 29 million gallons short of the possible yield from the same amount of raw material. A million tons more coal was carbonized at gas-works, and there was a relative increase in the proportion of gas-works at which benzole extraction was actively practised. Moreover, the yield of benzole per ton of coal carbonized at those works was also higher.

Coal carbonized at coke ovens increased by 2·6 million tons, with a consequential increase in the output of benzole.

The total output of refined light oils amounted in 1936 to 105·5 million gallons, of which 92 million gallons were refined motor spirit and the remainder consisted of 90's benzole, 90's toluole, xylole, solvent and heavy naphtha, pure toluene, pure xylene, and a small quantity of other products. The output of refined spirit from coke ovens was 30·1 million gallons, from gas-works 10 million gallons, and from tar works 11·1 million gallons.

The 13·5 million gallons of "other refined light oils" were produced for the chemical industry, largely as dyestuffs intermediates and would be derived principally from coke ovens, since benzole admixed with light spirit from vertical retorts is unsuitable for the production of pure aromatic products.

What the Official Figures Mean.

The figures in the Mines Report are a little bewildering owing to the confusion of crude and refined benzole. They give an output of 3·01 gallons per ton of crude benzole from coke ovens and 2·24 gallons per ton from the gas-works. Without going into technical detail it may be assumed that the refining processes to which the benzole is subjected reduce the total by roughly one-fifth, so that the relative figures are 2·41 gallons of refined benzole from every ton of coal carbonized at coke ovens and 1·79 gallons of refined benzole from every ton of coal carbonized at gas-works.

Another reasonable assumption is that, of the tar distillers' output of benzole, approximately one-third is derived from coke oven tar and two-thirds from gas-works tar.

Thus, instead of 30·1 million gallons of refined spirit from coke ovens, 10 million gallons from gas-works, and 11·1 million gallons from tar works, as shown in the report, the output is approximately 33·8 million gallons from coke ovens and 17·4 million gallons from gas-works.

If benzole had been extracted from the products of the whole of the 19,637,277 tons of coal treated in coke ovens in 1936 the output of refined benzole would have been about 47·3 million gallons, or 8·5 million gallons more than was actually produced.

Similarly, if benzole extraction had been practised to the full at the rate of 1·79 gallons of refined spirit per ton of coal carbonized by the Gas Industry, the 19,056,470 tons would have yielded 34·1 million gallons, or 16·7 million gallons more than the actual output. In simple figures, the potential yield of refined spirit from the 38,693,747 tons of coal carbonized by the combined industries in 1936 was 81·2 million gallons and the actual was only 52·2 million gallons—a deficiency of 29 million gallons.

Some Comparisons.

The present article is not concerned with comparisons with earlier years, although in passing it is satisfactory to note that the 1936 output of refined benzole was 70% more than in 1934. The coke oven output was 14·7% higher than in 1935 and the gas-works yield was 15·3% higher than in 1935. It may also be noted that the output per ton of coal in the Gas Industry (*i.e.*, per ton treated for benzole extraction) rose from 2·16 to 2·24 gallons, while the corresponding figure for coke ovens fell from 3·03 to 3·01 gallons.

It has been suggested that the present inadequate production of benzole is due to the inefficiency of the extraction plants at some of the coke ovens and to the absence of such plants from many gas-works. Opinion regarding the efficiency of coke oven benzole plants is somewhat keenly divided, one side claiming a general efficiency of as much as 95% and the other contending that it is seldom if ever more than 80 to 85%. The gas manager's answer to the contention that benzole extraction in the Gas Industry is inadequate is that most gas undertakings declare a calorific value so high that they cannot take all the benzole out of the gas without incurring the risk of sending out gas below the declared value.

Efficiency of Recovery.

Efficiency of recovery is a somewhat illusive term, for with some coals it is not possible to produce more than 1-1½ gallons of benzole per ton, while with others a yield of over 4½ gallons is possible. The total yield must therefore affect the efficiency figure. All modern coke oven plants wash out the benzole from the gas to the utmost convenient limit. There may be a few old plants with inefficient extraction, but they are few in number and have reached the stage at which their owners are contemplating replacing them.

The benzole industry, on its marketing side, is a specialized affair of its own, and it is useless for the actual producer to endeavour to sell direct to the local distributor.

The need for co-ordination in the benzole industry was recognized and met in 1919 when several of the largest producers in Great Britain founded the National Benzole Association with the object of standardizing quality, undertaking research, and generally operating for the good of British motor spirit. The National Benzole Association, over which Sir David Milne-Watson presides, is also the parent of the National Benzole Company, which was formed subsequently and has been responsible for building up a highly successful marketing organization and has done much to popularize British-produced benzole with motorists. If, as most people admit, gas leads the way in its advertising appeal, the National Benzole Company comes a close second.

With increased benzole production there must inevitably be an increase in the number of undertakings availing themselves of the benefits of the sales force of the N.B.C. The marketing and distributing of benzole, operating as it does under the direct control of the producers themselves, enables the greatest benefit to be returned to them. This form of co-operative trading has the further advantage that a large organization may be maintained to carry out research. It is right and proper that the spirit produced from coal in our own country should be sold in such a way as to benefit the user and the producer alike.

Following Upon the Recent Installation of 34 "Maxill" gas lamps in Newark Road, Lincoln, the City Council have now decided to extend this form of lighting along the Rookery Lane and Boultham Park Road areas by the addition of a further 59 "Maxill" lamps. It has also been agreed to accept the suggestion of the Gas Department to light the Newland and Carholme Roads by 26 "Keith" high-pressure lamps.

Gas Undertakings' Results

Blyth.

A record make of gas in 1937 is chronicled by the Blyth Gas Company, 257,530,000 cu.ft., or 1,077,562 therms, having been produced. The balance brought from Revenue Account is £9,083, and the dividend on the ordinary stock of 8% for the year will leave a balance to be carried forward of £12,401, as compared with £11,311 brought from the previous account.

Chester.

In the past year the Chester United Gas Company attained further records in sales of gas, the price of which, in spite of increased costs, has not, the Directors point out in their report, yet been raised. This is due to the fact that the economies resulting from the new carbonizing plant have offset those increases, but if the upward tendency in costs continues an increase in the ordinary price of gas will be necessary. There was a small net addition to the capital expenditure during the year, leaving a balance of over £21,000 to credit of Capital Account. The total quantity of gas sold was 484,460,250 cu.ft., or 2,301,186 therms. The balance of revenue carried to Profit and Loss Account is £15,745, as compared with the sum of £16,004 for 1936. Payment for the year of a dividend of 5¼% on the ordinary stock will leave a balance to carry forward of £7,832.

Colchester.

The Directors of the Colchester Gas Company are able to report a very satisfactory increase in the sales of gas—namely, more than 15,000,000 cu.ft., or 4·7% during the past year, as compared with 1936. When a comparison is made with 1934, the increase in sales amounts to no less than 41,000,000 cu.ft., or 14%, and during this period, from 1934 to 1937, the Directors point out, the net capital expended has increased by only £8,108. At this rate, the balance of £8,838 remaining at credit of Capital Account will meet the needs of the Company for several years to come. During the year additional capital was raised by the sale of £10,000 of 4% redeemable debenture stock, which was readily disposed of at a small premium. The balance for hire-purchase goods in hands of consumers is £8,647. The gross profit at Revenue Account amounts to £18,471, after allocating £2,600 to the Special Purposes Fund, £1,200 to the Renewal Fund, and writing off £7,113 for depreciation. The sum of £1,000 has been transferred from the net profit for the year to the Reserve Fund Account. The dividends on the ordinary shares are at the rates per annum of 10% on the "A" and 7% on the "B."

Cork.

The report of the Cork Gas Consumers' Company is a half-yearly one, and it states that, in comparison with the corresponding six months of the previous year, there has been a satisfactory increase in the sales of gas. The actual figures of consumption are not shown in the accounts. A somewhat extensive programme of repairs is indicated in connexion with retort-settings and other portions of the plant. The balance of revenue carried to Profit and Loss Account is £8,159, and after placing £2,503 to the credit of the Depreciation Fund, and after meeting other charges, there is a balance of £4,532, with which the Directors propose to pay the usual dividend at the rate of 8% per annum.

East Surrey.

That the business has shown satisfactory expansion during 1937 is reported by the Directors of the East Surrey Gas Company, whose chief offices are at Redhill. Figures with regard to make and sale of gas do not appear in the accounts, but the net amount received under this head was £122,059. The dividend for the year on the ordinary stock is 6%. The balance of revenue carried to Profit and Loss Account is £33,080, and the amount to be carried forward to the next accounts will be £4,328. Capital expenditure of £29,049 during the year includes the sum of £23,752 on new buildings, plant, and structures connected with manufacture, &c. The debit balance on Capital Account is £33,555, and on the same side of the Balance-Sheet appliances on deferred payments figure at £60,904. On the other side, loans total nearly £100,000. The Directors accepted with regret the resignation of Mr. W. H. Bennett as Managing Director, and record their appreciation of his outstanding services to the Company, of which he has been an officer for 27 years. As Deputy-Chairman, the Company will continue to receive the benefit of his varied experience of gas administration. As readers are aware, Mr. J. R. W. Alexander, M.A., LL.B., F.C.I.S., has been appointed General Manager of the Company.

Exeter.

Authority to raise additional capital up to £40,000 as required, under their Order of 1927, was given by the shareholders at the annual meeting of the Exeter Gas Light and Coke Company. Here will be another chance for people to invest money in an undertaking which, as we said in the "JOURNAL" last week, is "on their own doorstep," or, at any rate, "in their own city." For the past half-year the usual dividends are being paid—namely, at the rates per annum of 7½% on the new ordinary shares and 10½% on the original stock. During the year 1937 the sale of gas remained practically stationary—there having been a decrease of approximately one-half of 1%. The number of customers again steadily increased, from 20,570 in 1936 to 20,995, and the sale of apparatus continued on a highly satisfactory scale—over 1,000 new cookers having been installed in the year. Recently hire-purchase sales of apparatus have been considerably developed by the Company, and the amount of capital invested in this way stands now at £23,000. Mr. W. N. Westlake's retirement after 28 years' service as Engineer and General Manager, and a total period of active participation in the affairs of the Company of more than 50 years, during which he did so much to build up the prosperity of the undertaking, is naturally regretted, but, as a member of the Board, his services are still available, and the Directors feel that in Mr. H. H. Brown, for some years past Assistant Engineer to the Southampton Gas Company, they have found an able successor to Mr. Westlake.

Hartlepool.

The Gas Revenue Account for 1937 of the Hartlepool Gas and Water Company shows that the sales of gas—in addition to public lighting—amounted to 440,999,800 cu.ft., or 2,249,098 therms. There is a balance at debit of Capital Account of £43,635. The balance of Gas Revenue Account carried to Profit and Loss Account is £15,825. The dividend for the year is 5%, and there will be a balance of £22,893 to carry forward to the next account.

Hastings and St. Leonards.

The accounts of the Hastings and St. Leonards Gas Company for the year 1937 show that the total quantity of gas sold was 611,910,000 cu.ft., or 2,814,786 therms. During the year over £11,000 was expended on new mains and service pipes. There is a balance at debit of Capital Account amounting to £12,650. The gross profit for the year carried to Net Revenue Account is £28,245, and after making provision for the distribution recommended by the Directors, the sum of £5,340 will remain to be carried forward to the credit of the current year. The dividends for the year are 7% on the 5% converted stock, 5½% on the 3½% converted stock, and £6 8s.% on the 5% additional stock.

Ilfracombe.

The Directors of the Ilfracombe Gas Company, in their report for the year 1937, state that the sales of gas continue to increase. The total quantity sold was 538,720 therms. The dividend on the consolidated ordinary stock is 6% for the year. During 1937 just over £1,000 was expended on Capital Account, leaving a balance in hand of £3,925.

Maidstone.

The sales of gas by the Maidstone Gas Company during the past year show an increase of 1·79% when compared with those of 1936. In actual figures the total quantity sold was 479,896,800 cu.ft., or 2,441,947 therms. There was 4,554,500 cu.ft. of gas bought. The capital expenditure during the year was only a trifle more than the amount written off, and there remains a balance in hand on Capital Account of £9,888. The revenue balance carried to Profit and Loss Account is £21,327, which compares with £25,484 for 1936. In the Balance-Sheet there is a figure of £23,768 for apparatus under hire-purchase agreements. A contribution is being made to the Reserve Fund of £1,000, and the dividend for the year is 9% on the 5% capital stock, which will leave a carry-forward of £6,719.

Newport (Mon.).

During the year the Newport (Mon.) Gas Company arranged to take a supply of coke-oven gas from British Benzol and Coal Distillation, Ltd., at Bedwas. This supply became available on Dec. 8, and on the following day the Company ceased the manufacture of gas. The capital expended last year includes £27,801 on new mains for the coke-oven gas, and £5,287 for the new works in connexion with the same supply. At the end of the

year the balance at debit of Capital Account amounted to £35,916. In the Balance-Sheet there is an item of £10,321 for apparatus in the hands of hire-purchasers. The sale of gas to private consumers (and excluding that for public lighting and under contracts) amounted to 303,786,500 cu.ft., or 1,367,039 therms. The balance of net revenue and the amount brought forward from the previous year total £21,097. The dividend is at the statutory rate of 5% per annum, which will leave a balance to carry forward of £3,878—within a few shillings, the same sum as was brought forward from the previous year. The Directors announce that further reductions in the price of gas have been made to both ordinary and prepayment consumers. Of the 19,060 consumers on the Company's books, 14,555 take their gas through prepayment meters.

Ramsbottom.

Another half-yearly statement is that relating to the Ramsbottom Gas Company, in connexion with which a very successful business period is reported. Sales of gas to both domestic and industrial consumers show an increase of over 17%, while the output of new appliances constitutes a record at 712. The customary dividends are being paid.

Shotley Bridge and Consett.

The past year has been a very good one for the Shotley Bridge and Consett District Gas Company, who report an increase in gas sales of 5·6%, as compared with the previous year. A dividend at the rate of 5% per annum will leave a balance of £1,646 to be carried forward. A new showroom and office at Consett have fully justified the policy of the Board in providing up-to-date facilities for gas consumers in the business centre of the district, sales of appliances of all kinds by the Company during 1937 having created a record in the history of the undertaking.

Swansea.

The Swansea Gas Light Company were able to avail themselves of the favourable financial conditions existing last year by converting a considerable amount of redeemable 6½% debenture stock to 3½% stock, thereby saving a substantial sum under the head of capital charges. The dividend on the ordinary stock is 5% for the year. The sales of gas to private consumers totalled 2,258,212 therms. While this shows some decrease on the previous year, the sales of appliances—and particularly of those on hire-purchase terms—have been very satisfactory. Good work, too, has been done in extending the use of gas, on special tariffs, for baking, for central heating, and for gas-fired boilers. New showrooms have been equipped in the principal shopping area of the town. During the year about £4,500 was spent on new mains and services, and on Capital Account there is a debit balance of some £41,000. The profit on Revenue Account is £44,586, and after the distribution recommended there will remain a balance of about £12,000 to be carried to next account.

Watford and St. Albans.

An excellent increase of 4·2% in the sales of gas during 1937, as compared with 1936, is reported by the Directors of the Watford and St. Albans Gas Company. The total quantity of gas sold was 1,763,107,000 cu.ft., or 8,815,535 therms. During the year the net capital expenditure amounted to £128,145—of which £61,715 was on buildings, plant, &c., and £56,054 on mains and services. The debit balance on capital account is £106,815, and on the other side of the Balance-Sheet there is a bank overdraft of £155,063. Apparatus on hire-purchase figures at £55,814. The balance carried to Profit and Loss Appropriation Account is some £4,000 up, at £92,330, after placing £2,000 to the Special Purposes Fund. The dividend on the ordinary stock of the Company is 7% for the year.

Whitby.

The balance of revenue carried to the Profit and Loss Account for the year 1937 by the Whitby Gas Company is £2,779, but in this connexion the Directors in their report point out that, owing to the introduction of mechanized billing, meter readings for the year have been closed at an earlier date than is customary—thus "accounting for the apparent reduction in the year's gas rentals." A net addition of some few hundreds to the Capital Account leaves the credit balance at £331. The quantity of gas sold to private consumers was 266,487 therms, and on the same side of the Revenue Account there appears an item: "Calor gas, £62 18s. 8d." During the year 113 new consumers were connected up, and new mains have been laid and old mains re-laid in various parts of the town to meet the increased demands for gas. The dividends for the year are 6½% on the original capital and £4 11s.% on the additional and new additional capital. These will leave a balance of £1,023 to be carried forward to the next account.

Wolverhampton.

The Wolverhampton Gas Company have enjoyed a very successful year. There has been an increase of consumption of 3·66% during 1937, following a substantial increase in the previous year. The demand for all types of gas appliances has been exceptionally good. Arising out of this expansion of the Company's business, the accommodation at the town offices and showrooms has become inadequate, and, the Directors say, "in many respects obsolete." This being so, the Board have under consideration the complete re-building of the premises, which were erected in 1880. During the year £11,652 was spent on new mains and services, but after allowing for plant dismantled and depreciation the net addition to the Capital Account is only £6,971. The capital debit balance is £156,410. In the Balance-Sheet there is an amount of £40,171 for cookers, fires, &c., on hire-purchase, and 5,001 £1 shares in the Albrighton Gas Company, Ltd., appear at cost. On the other side there is a sum due to bank of £36,639. The total quantity of gas sold was 1,243,995,800 cu.ft., or 5,597,981 therms at declared calorific value (5,617,885 therms at actual calorific value). About one-third of the quantity sold was for manufacturing and power purposes. The balance of revenue carried to Profit and Loss Account is £29,495, which compares with £31,980 for 1936. The dividend for the year is 7% on the consolidated ordinary stock, which will leave a balance of £320 to be carried forward.

Yorktown (Camberley) and District.

On the gas undertaking of the Yorktown (Camberley) and District Gas and Electricity Company there was spent during the year 1937 upon new buildings, manufacturing plant, storage works, and other structures connected with manufacture, the sum of £26,741, and the combined Balance-Sheet shows a debit on Capital Account of £81,523. The profit on Gas Revenue Account for the year is £18,890, and the quantity of gas sold 320,044,100 cu.ft., or 1,440,198 therms. As compared with 1936, gas sales show an increase of 3·24%. The dividend for the year of 6¼% on the consolidated ordinary stock of the combined undertaking will leave £11,326 to be carried forward to the next account.

Drakes, Ltd.

The report of the Directors of Messrs. Drakes, Ltd., Halifax, for the year ended Dec. 31, 1937, states that the profit for the year is £8,370, and the Directors recommend that this sum, together with the amount of £8,693 brought forward from last year, be carried forward to next year's accounts.

The anticipated improvement in trade referred to by the Directors a year ago has been maintained during the period under review.

Difficulties have been experienced in obtaining various classes of raw materials, which have limited the Firm's activities in certain markets and delayed progress in connexion with work in hand, and these conditions still prevail.

The Directors, however, despite such difficulties, consider the position of the Company and its future prospects to be distinctly favourable.

New British Standard Specifications

The British Standards Institution has made a further addition to its already important series of Standards for screw threads, bolts, nuts, set-screws, and washers by the issue of a specification for the dimensions of grub screws.

This new Standard has been prepared in co-operation with the Metal Thread Screw Manufacturers' Association. It covers conical and cop-pointed grub screws with slotted heads and hexagon socketed set screws, with details of the appropriate hexagon wrenches.

These screws are for B.S.W., B.S.F., B.A., and B.S.P. threads in sizes from ⅛ to ¼ in., and Tables indicate the sizes and lengths that can be obtained from stock.

Copies of this British Standard (No. 768-1938) may be obtained, price 2s. 2d. each, post free, from the Publications Department of the Institution, 28, Victoria Street, London, S.W. 1.

Another British Standard just published is for Steel Flanged Joints for Hydraulic Pipe Lines for pressures up to 4,500 lb. per sq.in.

This Standard specifies a flange loosely screwed on to the pipe and occupying solely the function of drawing the pipes together. The resulting joint is thus made in the pipe ends, the flange being screwed on loosely to allow of hand adjustments, so that the length of pipe end protruding from the flange can be easily adjusted to suit different types of joint rings.

In view of the special type of joint, Appendices have been included giving recommendations regarding pipe thicknesses and joint rings, and an easy practical method of cutting pipe lines accurately at right angles to the axis of the pipe, on site, is also given.

Copies of this British Standard (No. 778-1938) can be obtained from the Standards Institution, price 2s. net, or 2s. 2d. post free.

Modern Street Lighting by Gas

I.E.S. Discussion at Glasgow

The Glasgow Branch of the Illuminating Engineering Society met in the Gordon Restaurant, Glasgow, on Feb. 9, when a lecture on "Modern Street Lighting by Gas" was given by Mr. W. J. G. Davey, B.Sc., of the Parkinson Gas Lighting Research Bureau, Birmingham. There was a large attendance, which included many prominent figures in the Gas Industry in Scotland.

The Author, having summarized the findings of the Final Report of the Ministry of Transport Departmental Committee on Street Lighting, referred to the recommendation for the amount of light to be provided in the case of Group A roads. This, for roads not exceeding 40 ft. in width, is a luminous output per lantern of more than 3,000 lumens per 100 linear feet of carriageway, and lying between this value and 8,000 lumens. It is emphasized in the Report that these figures relate to the luminous output of the lantern (not the naked source) and refer to the average luminous output throughout the life of the source. According to paragraph 53 "the nomenclature ordinarily used for lighting fittings in the electrical industry is in terms of either the wattage of the lamp used in the fitting or the light output of the lamp in lumens, while the Gas Industry uses either the consumption of gas in cubic feet per hour or the lower hemispherical candle-power of the lanterns. In order to base our proposals on some measure common to both we propose to speak in terms of the total light output of the lantern in lumens; but since controlled distribution of the light emitted by the lanterns is necessary in order to obtain the best results, it must not be inferred that the lantern which absorbs the least amount of light or that which has the largest total light output is necessarily the most effective."

With the latter part of this statement, the Author said he was in full agreement, for it was the light which actually fell upon the carriageway which was effective in lighting the carriageway, and modern gas street lighting units had been designed with a view to the most effective distribution of the light, at the sacrifice of a certain amount of the luminous output of the source by absorption in the reflective devices.

The recommendations of the Departmental Committee, he continued, were necessarily very broad and required a common-sense interpretation. It had been proved, over and over again, that a 4,000 lumen lamp might be vastly superior to a 6,000 lumen lamp, from the points of view of visibility and illumination, and it was a poor argument to put forward that the source with the greater number of lumens can be adapted to give a superior performance. It was not upon the light output of the source that lanterns were to be assessed. If this were the case, illuminating engineering would be no more, and a state of affairs would exist which would be hopeless. To assess a lantern on the total lumens would be equivalent to judging the value of an orchard from the weight of the trees.

In the Maxill brochure (Parkinson pamphlet) were shown the lumen outputs of lamps with and without reflectors. Twenty per cent. of the lumen output had been sacrificed to convert the lamp into an effective street lighting unit. Lighting units would continue to be judged on their performance, provided that the minimum lumen output specified by the Final Report was exceeded. It would still be necessary to compare competitive schemes, and the only satisfactory way would be to erect sample installations, to inspect these, and to judge the visibility first-hand. If this was not practicable, existing installations in neighbouring districts would require to be visited to determine the suitability of the particular lighting units.

Moreover, it would still be desirable to examine the distribution of illumination for a particular installation. The determination of horizontal illumination as an index of road surface brightness would be desirable, together with that of vertical illumination, which was a guide to the brightness of an object in the road.

Two factors affecting visibility were brightness contrast and colour contrast. This being the case, it followed that from the visibility standpoint two lighting units having the same lumen output and giving similar distributions might yet differ, one being superior to the other. This was a very important point in the assessment of lighting units.

Mr. Davey then showed Parkinson equipment for Group A and B roads. The average output throughout the life of the sources should exceed 600 lumens per 100 linear feet and should lie between this value and approximately 2,500 lumens per 100 linear feet. The lower limit would be suitable for roads on housing estates and other quiet residential roads carrying but little vehicular traffic, and the upper limit for those roads which, while not coming within the category of traffic routes, carry considerable pedestrian and vehicular traffic."

The Final Report, he concluded, imposed no insurmountable obstacles to the gas lighting engineer. Whatever the criterion, gas could satisfy it, as the many gas lighting installations in that district would prove. Wherever there was street lighting, gas would be to the fore in the production of scientifically planned and effective schemes.

The Institution of Gas Engineers

Additional Examination Results

The following is a supplement to the List given in the 14th Report of the Gas Education Committee presented at the 9th Autumn Research Meeting of The Institution of Gas Engineers on Nov. 2, 1937:

Candidates Qualifying for Certificates in Gas Engineering and/or Gas Supply.

EXTERNAL CANDIDATES.

Higher Grade Gas Engineering.

Class.	Name.	Town.
Second	Johnson, B. W.	St. Helen's
,,	Sanderson, E. J.	Thorpe Bay

Ordinary Grade Gas Engineering.

Class.	Name.	Town.
Second	Olver, T. D.	Burnley
,,	Wilkinson, J. H.	Morecambe

Higher Grade Gas Supply.

Class.	Name.	Town.
Second	Bishop, S. G.	Wimborne
,,	Hoadley, E. J.	Herne Bay

Ordinary Grade Gas Supply.

Class.	Name.	Town.
Second	Wilkinson, J. H.	Morecambe

INTERNAL CANDIDATES.

Higher Grade Gas Engineering.

Class.	Name.	Town.
First	Black, G. H.	Manchester
,,	Bramhall, R. J.	,,
,,	Illingworth, F. K.	,,
Second	Edwards, C. H.	Wrexham
,,	Green, D. K.	Manchester
,,	Kinsey, R.	Newcastle-upon-Tyne

Ordinary Grade Gas Engineering.

Class.	Name.	Town.
First	Angles, D. B.	Kirkcaldy
Second	Denham, J.	Huddersfield
,,	Hough, H. H.	Manchester
,,	Jennings, G. P.	Bradford
,,	Keywood, H. C.	Leicester
,,	Stirling, T.	Glasgow

Higher Grade Gas Supply.

Class.	Name.	Town.
First	Bremner, H. J.	Westminster
,,	Jacobsen, L. J.	,,
,,	Newman, H. C.	,,
,,	Thornton, A. T.	,,
,,	Treagus, G. A.	,,
Second	Bentley, G. A.	Huddersfield
,,	Brearley, N.	,,
,,	Cole, G. F.	Westminster
,,	Davies, N. G.	,,
,,	Davis, K.	Tunstall
,,	Duggin, E. G. F.	East Ham
,,	Goodman, J. E.	,,
,,	Haddacks, N. A. C.	Westminster
,,	How, C. A.	,,
,,	Old, A. A.	,,
,,	Shergold, A. J.	,,
,,	Witt, W. S.	,,

Ordinary Grade Gas Supply.

Class.	Name.	Town.
First	Armstrong, J. B.	Leeds
,,	Tweedle, F.	Liverpool
Second	Nelson, S. N. P.	Leeds
,,	Patterson, F. O.	Newcastle-upon-Tyne
,,	Stirling, T.	Glasgow

Ewart & Son, Ltd.

The Directors of Messrs. Ewart & Son, Ltd., state that for the year ended Dec. 31, 1937, the balance available, after making full provision for all bad and doubtful debts and contingencies, and after transfer of £5,000 from Reserve for Taxation, amounts to £23,038. To this falls to be added £4,165, the amount brought forward from last year, making a total of £27,202. The Directors recommend that the preference dividend already paid, of 16% for the year (subject to income-tax), be confirmed, and that there be paid to the Ordinary Shareholders a cash distribution at the rate of 10% (not subject to income-tax) out of the realized capital profit from the sale of investments. Sales and output show a decrease, but the Company's factories and plant have been maintained in efficient condition. There is carried forward to next year's Accounts a sum of £3,154.

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Domestic Gas Ovens—

RELATION OF DESIGN TO COOKING QUALITY

by

E. W. B. DUNNING, B.Sc. (Lond.), A.I.C.,

and

R. F. HAYMAN, B.Sc. (Lond.), A.I.C.

(of the Watson House Cooker Laboratory, Gas Light and Coke Company).

A Paper read before a meeting of the London and Southern District Junior Gas Association held at the London School of Hygiene and Tropical Medicine, Keppel Street, W. I—the PRESIDENT (Mr. R. N. LeFevre, of the Gas Light and Coke Company) presiding.

I. INTRODUCTION.

The development of the gas cooker towards the end of last century ([1, 2, 3]) led to a revival of the use of gas. Even now newer uses of gas have not ousted it from its position of supremacy. To-day there are about 7 million gas cookers in use in Great Britain, accounting for about half of the total gas sold, and of this half about one quarter (*i.e.*, one-eighth of the total gas consumption) is used in the oven. The peak demand for gas still occurs at mid-day on Sunday and is almost entirely due to the use of the gas cooker; about half of this peak is due to the oven.

In view of the importance of the gas cooking load surprisingly little has appeared in the Technical Press on this subject. The Gas Investigation Committee ([4]) of the Institution of Gas Engineers in 1924 made a report on a standard method of testing gas ovens. Further Papers ([5, 6, 7, 8]) appear in the bibliography.

The most important attribute of a gas oven is the quality of the cooking, yet even less information is available on the factors which affect this quality. An interesting Paper was given on this subject by Hartley ([9]) on the introduction of the bottom flue "New World" oven.

This Paper is really a co-operative effort of the Cooker Laboratory and the Home Service Section of the Gas Light and Coke Company. Little could have been done without the help of Miss E. Willans, M.B.E., and a number of her demonstrators. Thanks are also due to Mr. C. H. Purkis, B.A., who carried out much of the experimental work and to the Governor and Directors of the Gas Light and Coke Company for permission to publish this Paper.

II. The Cooking Process.

A discussion of the changes which take place during cooking would take up too much of the time available and only a brief outline is possible sufficient to enable later sections to be understood. In this Paper we have only considered the roasting of meat and the baking of cakes. These are the foods most often cooked, and it is generally found that an oven that will cook these articles will also cook the innumerable varieties of dish required.

Meat.

Most joints of meat consist of bundles of fibre surrounded by connective tissue. One type of tissue may be softened by heat and moisture and converted into gelatine, while another type is unaffected by heat and remains as a tough membrane. The cooking quality will depend on the amount and type of connective tissue.

Meat shrinks in volume during the cooking process and the muscle fibres lose moisture even when the meat is cooked in water. The loss of water is, however, greater than that expected by the reduction in volume, and it is probable that a further cause is the osmotic pressure between the moist surface and the interior. The meat juices will be expressed and washed into the liquid during boiling, but during roasting evaporation occurs and the protein and salts in the juices will be concentrated on the surface.

The colour changes which take place during cooking are no absolute criterion of the degree of cooking, which is best judged by the temperature at the centre of the joint. When a centre temperature of 140° F. is reached the meat is considered underdone and over 160° F. well done ([10]).

Cakes.

The cellular structure is produced by the formation and expansion of steam carbon dioxide or air. CO_2 is formed from baking powder or yeast and air is incorporated in beaten egg or fat. The gluten ([11]) in the flour is stretched and forms an elastic membrane which sets at about 180° F. The gases will diffuse out of the mixture, and it is necessary that the interior of the cake sets before this proceeds very far. If the crust sets too quickly and pressure is generated inside the cake either the gases are forced through the outer membrane and the cake does not rise or the membrane is broken. The starch in the surface layers is partially converted into sugar which together with the added sugar caramelizes; this gives the crust its brown colour. Increase in sugar content of the mixture will give an increase in the depth of colour of crust independent of the degree of cooking, thus the colour of the exterior is no absolute guide to the cooking of the interior.

The velocity of hot gases over the food was found to have an important effect. On theoretical grounds one would assume that an increase in velocity reduces the thickness of the stagnant layer of cooled gases round the food and so increases the heat transfer. This increased heat transfer would lead to over-cooking of the exterior as the rate of heat conduction inwards is relatively slow, therefore a lower gas temperature is necessary with increased velocity.

A useful line of research would be an investigation into the effect of velocity and temperature of hot air on the heat transfer and cooking quality.

III. Determination of Cooking Quality.

A major difficulty in determining the effect of different factors in oven design on cooking quality is the measurement of cooking quality itself. The standardization of ingredients and method of preparation is necessary in order to obtain the same cooked product under identical conditions. The quality of the cooked product is almost entirely determined by the personal opinion of the demonstrator as to appearance and palatability, although attempts have been made to measure some of the factors mechanically. The American Institute of Baking ([12]) uses an apparatus for determining the elasticity of breadcrumb, the tensile strength ([13]) can be measured and the colour of the crust can be matched against a standard colour chart ([14]); the density can be determined by the displacement of small seeds ([13]).

The palatability of food is an elusive factor, as different people have widely different optimum standards; thus one may like roast beef underdone, whereas another will like it well done; some like cakes well-browned (perhaps almost burnt), while others prefer a lighter shade. Another factor is the degree of flavour consciousness ([15]); some may be able to detect small differences in flavour, while others may not be able to detect wide differences in texture or flavour of food. The American Institute of Baking ([12]) obtained fairly uniform judging of bread by different experts, but found it necessary to have eleven different factors to be judged. The internal characteristics could be more easily judged than external appearance. Maiden ([16]) has formulated a system of bread judging, while Moir ([17]) showed the widely differing flavours attributed to four jelly flavours, and the difficulty of selecting suitable judges of food. It is essential to obtain scores for a number of judges and to in-

clude such mechanical determinations as are possible and submit these to statistical analysis in order to determine true differences in cooking quality.

IV. Losses Occurring During Cooking.

Vitamins.

Most are comparatively stable at ordinary cooking temperatures ([18, 19]), but vitamins B and C may be lost in expressed juices, being water soluble. Although vitamins B, and C are rather easily destroyed by heat, the losses in meat ([20]) and bread ([21]) are not serious, owing to the low temperatures developed in the interior.

Salts, Protein, and Fat.

All can be recovered by eating the dripping from roast meat. If the rate of evaporation is reduced by increasing the humidity of the oven atmosphere or decreasing the temperature, meat juices will drip off and increase the losses of salts and protein. Tests ([22, 23]) have shown that there is a much greater loss of meat essence in closed tins or electric ovens compared with ventilated gas ovens. The losses of fat are determined by the melting point in relation to the temperature of the meat and the position of the fat in the joint ([10, 22, 24]). When fat in the interior of a joint melts it is more or less soaked up by the fibres.

Water.

Cake mixture and meat contain a large proportion of water, cake mixture 20-40%, meat 65-70%. During cooking a proportion of this water is driven off. With cakes the loss is by evaporation, but with roast meats some may be retained in the dripping and meat essence which are normally collected. Practically the whole of the loss of weight of meat on cooking is due to loss of water vapour, and this has no effect on the food value of the cooked joint.

In an investigation of the effect of temperature and oven atmosphere on cooking losses of meat it is essential that comparisons are made with similar cuts of meat, if possible from the same animal ([10]).

Wide differences in weight loss have been found in joints when cooked under identical conditions ([25, 26, 27]). A well-done joint of meat naturally has a greater cooking loss than an underdone joint. On cooking to a definite joint-centre temperature a number of investigators ([25, 26, 28]) have found that the weight loss is proportional to temperature. Low temperatures require a longer cooking time, but the conduction of heat to the centre is effected with less evaporation from the surface layers; the exterior of the meat, however, is less browned and has less flavour.

It has been suggested that the higher humidity of the unventilated oven leads to lower weight losses, but experiments ([10, 22]) have failed to support this contention. Weight losses are, in fact, higher in closed than in open tins, but at least a part of this difference is due to more complete cooking in the same time in a closed tin.

A reduced loss in weight on cooking has been an important argument in the selling of electric cookers, in some cases the supposed saving in weight loss, although only water, has been credited in terms of cost of meat to offset the higher fuel cost of electricity compared with gas. Many comparisons of weight loss in gas and electric ovens have been reported by electric ([29]); gas ([25, 30, 31]), and impartial investigators ([23, 26, 32, 33]); these have shown that there is little difference when the conditions are standardized.

The use of steam during the baking process does not—as might be supposed—considerably reduce the weight loss ([12]), so that the water content of the oven atmosphere is not a very important factor.

The loss of moisture continues at a reduced rate after the food is removed from the oven, for example with bread about 15-20% of the total loss in weight occurs during the cooling after removal from the oven ([12]), hence the loss in weight should be qualified—*i.e.*, baking or baking *plus* cooling loss.

V. Effect of Products of Combustion.

In an internally heated gas oven the food is surrounded by the products of combustion considerably diluted with heated air. The electrical and solid fuel industries make bold claims for the effect of these products or "fumes" on the food. That it is largely a "talking point" of the electrical salesmen rather than perception by the user is obvious from the fact that there is practically no demand for externally heated gas ovens which would have all the supposed advantages of electric or solid fuel ovens.

The products of combustion of town gas have already been studied ([35, 36]) and the following concentrations are typical for a domestic oven.

CO_2, %.	Sulphur Oxides, %.	Nitric Oxides, %.	Carbon Monoxide, %.	Water Vapour, %.
1·5	0·0007	0·0015	0·0015	3·0

A panel of doctors ([37]) convened by the Royal College of Physicians has shown that these concentrations are quite innocuous if breathed, and if absorbed by the food and eaten probably have less effect.

It is, however, very unlikely that any of the products will be absorbed, except during the first few minutes when the surface of the food is below the condensation temperature of the flue gases, owing to the fact that food is giving off water vapour during cooking.

Hartley (*) cooked custard, red herrings, and onions in the same oven, and yet no trace of flavour of red herring or onion was detected in the custard. We have heated a porous pot full of distilled water in an internally heated gas oven; the water percolated through the pot and was evaporated, yet no trace of the products of combustion could be detected in the vessel or contents at the end of 50 hours' heating.

Staining of Oven and Kitchen Walls.

The products of overheated fat are the main cause of staining although the volatile constituents of the food and dust present in the air may contribute.

The amount of greasy vapours is determined by the method of cooking; little need be formed unless the meat tin is overheated. Thermostatic control and correct size and position of the baking tin reduce the possibility of this happening. Tests ([38, 39]) with modern gas and electric cookers have failed to show any material difference in the staining of walls.

VI. Heat Transfer to Food During Cooking.

Conduction.

Figs. 1 and 2 show the rate of rise in temperature and loss of moisture during the cooking of beef and cake mixture. When the joint was removed from the oven a temperature gradient existed, and heat continued to be conducted to the centre and cooking proceeded for a short time. If chilled meat is not thoroughly thawed before placing in the oven the interior will take longer to reach a cooking temperature and

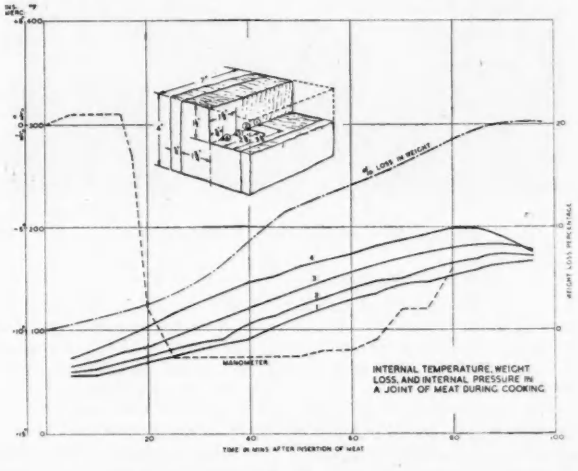

% LOSS IN WEIGHT
MANOMETER
INTERNAL TEMPERATURE, WEIGHT LOSS, AND INTERNAL PRESSURE IN A JOINT OF MEAT DURING COOKING.
TIME IN MINS AFTER INSERTION OF MEAT

Fig. 1.

will be undercooked. In cake the temperature at all points reaches 212° F. towards the end of the cooking process. Steaming the same cake mixture produces the same cellular structure, although the usual crust is not formed ([12]).

The flow of heat into the food is complicated because the temperature of the surface is rising during the cooking process. There is also a probable fall of thermal conductivity in cake mixture during cooking, as the cellular structure in-

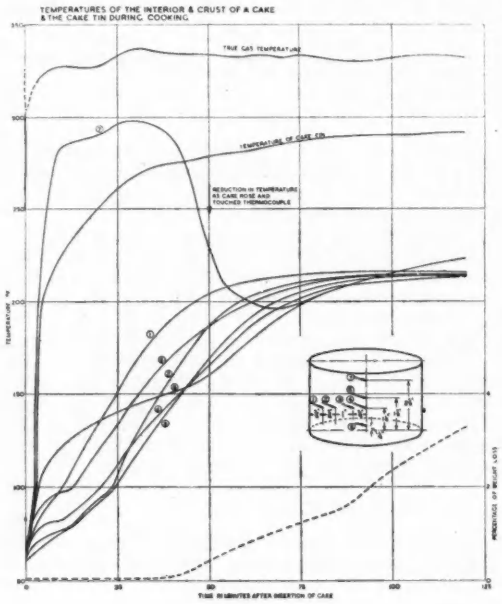
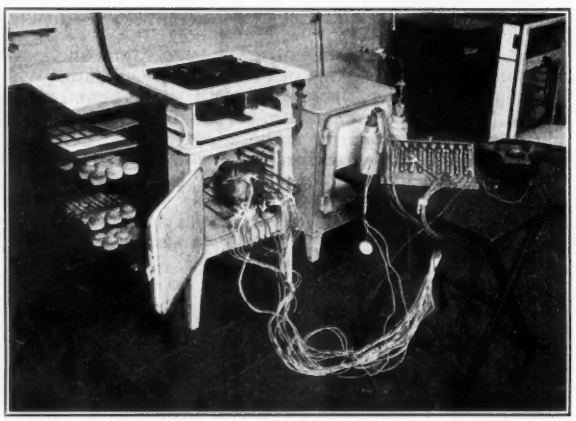

TEMPERATURES OF THE INTERIOR & CRUST OF A CAKE & THE CAKE TIN DURING COOKING
TRUE GAS TEMPERATURE
TEMPERATURE OF CAKE TIN
REDUCTION IN TEMPERATURE AS CAKE ROSE AND TOUCHED THERMOCOUPLE
TEMPERATURE °F
PERCENTAGE OF WEIGHT LOST
TIME IN MINUTES AFTER INSERTION OF CAKE

Fig. 2.

creases, and a high rate of diffusion of water; in meat there is probably movement of water backwards and forwards during cooking. At the completion of cooking analyses of the cake and meat showed that the loss of moisture was fairly well distributed throughout the food.



Taking Cake Temperatures During Cooking.

Measurement of Temperature.

Before the effects of convection and radiation can be discussed it is necessary to measure the temperature of the circulating gases, oven walls, and cake trays. Thermocouples were welded to the oven walls and gates to obtain good thermal contact in the measurement of surface temperatures. The temperature, as recorded by an ordinary thermometer or thermocouple, is influenced by their size and the conditions of the surrounding surfaces ([40]). The temperature of the circulating gases can best be obtained by using a suction pyrometer ([41]).

The effect of size is shown in fig. 3, where a thermocouple was surrounded by a blackened or polished sphere similar to that used by Bedford and Warner ([42]) for measuring comfort conditions in rooms. The recorded temperature fell as the size of sphere increased, until a steady value was obtained with a 2 in. diameter sphere. As the size decreases the convection coefficient increases and the heat gained by convection is increased. If the sphere is polished the loss by radiation is reduced and a higher temperature is recorded. In an externally heated oven where the walls were at the same temperature as the interior hot gases, the same temperature was recorded by the blackened sphere, bare thermocouple, and suction pyrometer. Fig. 4 shows the difference in temperature between that shown by a thermocouple surrounded by a 5 in. blackened sphere, a bare thermocouple, and the true gas temperature; increase in lagging increases the wall temperature and thus reduces the heat loss by radiation to the walls. Even the blackened sphere does not measure the thermal condition of an oven as it affects cooking since the surface temperature of the food is generally below that of the walls as well as the hot gases and is receiving heat from both.

Temperature Distribution.

The oven walls and interior fittings, including cake trays, &c., will become heated by convection from the hot gases, and will radiate heat. The walls will normally be at a lower

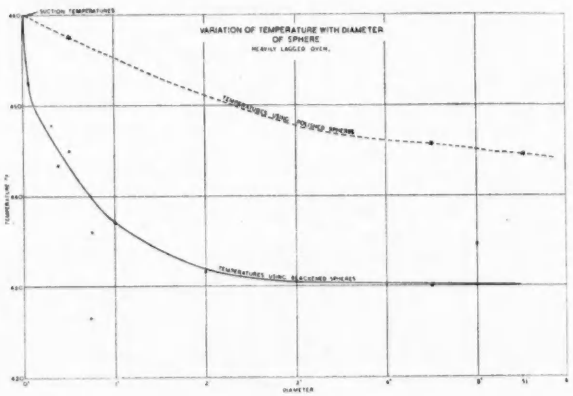


Fig. 3.

temperature than the hot gases, depending to some extent on the heat loss through the walls.

Fig. 5 shows a fairly complete picture of the temperature changes in an oven during the cooking process.

Temperatures of oven surfaces, cake tray, and scone surface and centre, as well as the temperature of the hot products, have been measured during the heating up and cooking process.

The gas rate during heating and cooking is higher than under equilibrium conditions in an empty oven. Thus the temperatures of the oven sides and gates, between which the hottest gases rise, rose to about 50° F. above their equilibrium temperatures.

The remaining surfaces were cooler than equilibrium condition. Two trays of scones were cooked, thermocouples being attached to the bottom tray and to the scones. The bottom tray was moved up to the top tray position in the normal way when the top tray was removed. The surface temperature of the scones rose rapidly at first, but they did not brown at the maximum temperature of 280° F.; on moving up the tray, the temperature rose suddenly, and browning rapidly took place.

Convection.

The hot air or gases travelling over the food impart heat and carry away evaporated moisture from the surface of the food. The spatial position of the burners and flue outlets affects the direction and velocity of the hot gases. The vertical distance between the burners and the flue outlet determines the flue pull available to draw the hot gases through the oven ([6, 43]). Resistances to this flow are the areas of inlet

and flue outlet, the change of direction due to the position of flue outlet, provision of baffles such as inner crown, gates, and ribs on crown, and a variable factor—the food being cooked, with its accompanying baking tins, cake trays, &c. The size of the flue outlet is normally made the controlling factor. The baffles alter the direction of flow of some of the hot gases and can be made to alter the distribution of heat and browning in the oven. While improved cooking can usually be obtained with these baffles, they make the oven more difficult to clean. The oven burners may be placed vertically, horizontally, or between the two. With vertical burners the oven gates act as bafflers and direct the hot gases between the trays. The resistance effect of the space between the oven gates and walls may vary somewhat in manufacture owing to the bulging of the oven linings due to dimensional errors or density of packing, but measurements of the bulging at various densities of packing have shown that the latter is inappreciable in at least one design of oven.

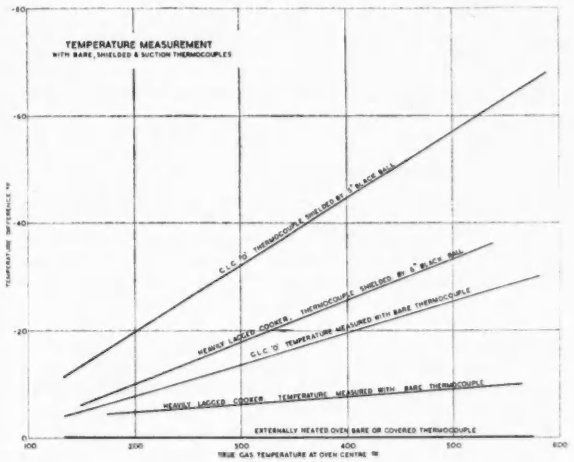

TEMPERATURE MEASUREMENT
WITH BARE, SHIELDED & SUCTION THERMOCOUPLES
G.L.C. 'O' THERMOCOUPLE SHIELDED BY 5" BLACK BALL
HEAVILY LAGGED COOKER. THERMOCOUPLE SHIELDED BY 5" BLACK BALL
G.L.C. 'O' TEMPERATURE MEASURED WITH BARE THERMOCOUPLE
HEAVILY LAGGED COOKER. TEMPERATURE MEASURED WITH BARE THERMOCOUPLE
EXTERNALLY HEATED OVEN BARE OR COVERED THERMOCOUPLE
TRUE GAS TEMPERATURE AT OVEN CENTRE °F

Fig. 4.

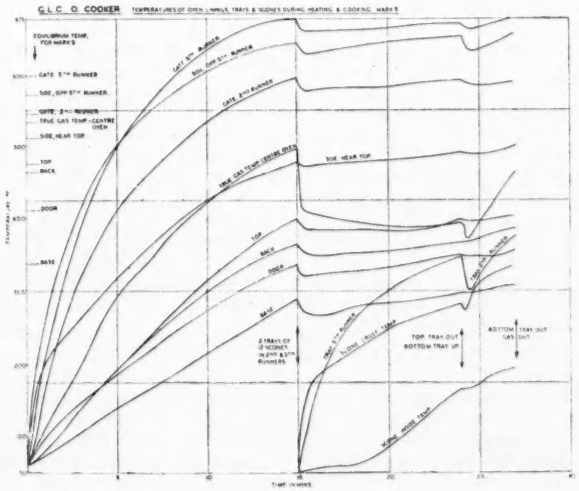


Fig. 5.

We have found that the oven more difficult to clean. The oven burners may be placed vertically, horizontally, or between the two. With vertical burners the oven gates act as bafflers and direct the hot gases between the trays. The resistance effect of the space between the oven gates and walls may vary somewhat in manufacture owing to the bulging of the oven linings due to dimensional errors or density of packing, but measurements of the bulging at various densities of packing have shown that the latter is inappreciable in at least one design of oven.

Variation in aeration of flame has little or no effect with vertical burners, as the hot gases rise in a vertical stream. When the burners are set at an angle there is a velocity component along the axis of the burner ports due to the discharge of the air-gas mixture and a vertical component due to the rise of the hot gases. The higher the aeration of the flame the greater will be the velocity along the axis of the burner ports, and a concentrated stream of hot products may impinge on some of the food and cause burning. Unsatisfactory cooking due to this may be due to incorrect adjustment by the fitter or variation in gas quality. The provision of fixed injectors and a constant pressure governor remove the possibility of incorrect adjustment, and by adjusting the degree of aeration in the laboratory to that obtained at the mid-point of the possible variation in gas quality, the effect of variation due to this factor is reduced to a minimum. The improved cooking quality obtained with luminous flames described by Chandler ([41]) has not been confirmed. The modifications in the design of air inlet and flue probably account for any improved thermal performance obtained.

The oven grids may also be modified to improve the cooking quality. Stops may be placed to prevent the food being placed too near the burner, or solid portions may be added to the grids to deflect the hot gases.

Variation in Flue Design.

There are a number of different arrangements of oven flue at present being used, and the effects of five variations in flue design have been determined for one oven.*

Fig. 6 shows the various arrangements. All the top outlets were at the same height, as were the bottom outlets. The maximum gas rate and door fit were checked after each alteration. The same accessories (burners, gates, shelves, governor, thermocouples, meters, &c.) were used throughout the experiments. Tests with the original arrangement of bottom flue were repeated at the end of the various alterations, and substantial agreement was obtained.

To ensure the same combustion characteristics, the flue outlet area (keeping the same shape—*i.e.*, ratio height/width) was adjusted to give the same maximum CO_2% at 50% gas pressure overload at Mark 4 setting. A constant initial gas rate was used, but as the thermostat came into operation the

* All the experimental work described in this paper was carried out, unless otherwise indicated, in ovens which have two vertical flame burners and direct bottom flue outlets (G.L.C. No. 1 and No. 0). The conclusions reached apply strictly to this burner arrangement only and further work is in hand in order to determine how far these conclusions follow for single and inclined burner arrangements.

VARIOUS ARRANGEMENTS OF FLUE OUTLET
No.1 G.L.C. COOKER.

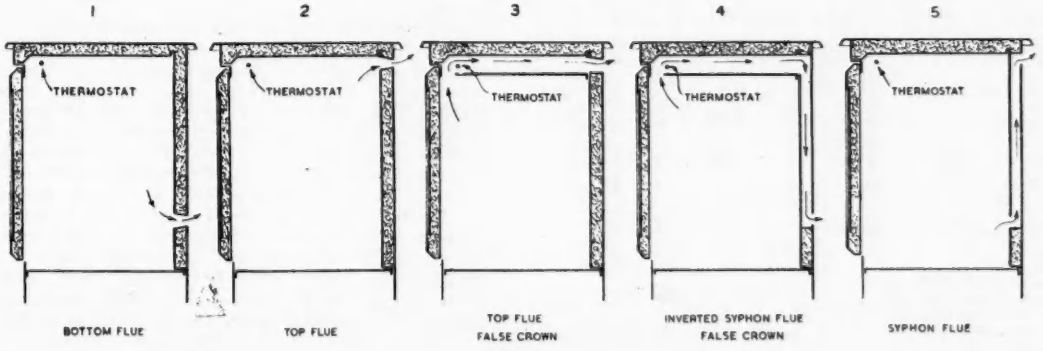


Fig. 6.

gas rate was reduced and the CO_2% became steady, but at a different value for each flue arrangement.

The results of maintenance and cooking tests are shown in fig. 7. While the results are in the same order there is less difference between the gas rates for cooking with the different flue systems than with the maintenance gas rates. The simple top flue outlet cooker is the least efficient—as would be expected—but there is surprisingly little difference between the other arrangements. With the syphon flues the gases travel in part of the space between the inner and outer casing, and thus this area was unlagged except that the hot flue gases acted to some extent as an insulator. The losses through the lagging were higher in these two cases, the other lagging losses being very similar. The variation of flue loss and CO_2 concentration with oven temperature appear to be similar for all the ovens; there does not appear to be that great difference expected between the top and bottom flues.

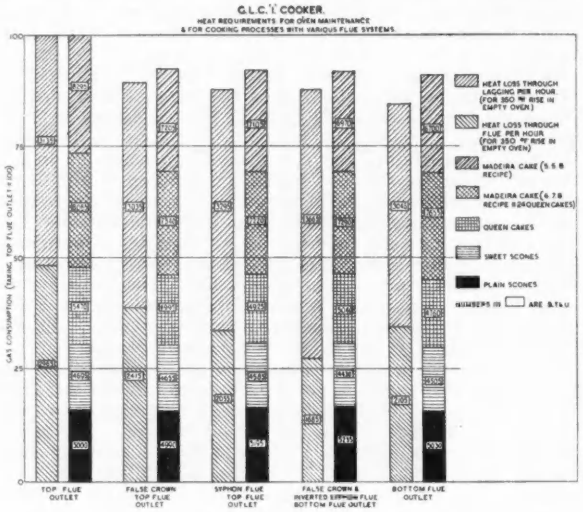

G.L.C. 'I' COOKER.
HEAT REQUIREMENTS FOR OVEN MAINTENANCE & FOR COOKING PROCESSES WITH VARIOUS FLUE SYSTEMS.
HEAT LOSS THROUGH LAGGING PER HOUR (FOR 350 °F RISE IN EMPTY OVEN)
HEAT LOSS THROUGH FLUE PER HOUR (FOR 350 °F RISE IN EMPTY OVEN)
MADEIRA CAKE (5.5.8 RECIPE)
MADEIRA CAKE (6.7.8 RECIPE & 24 QUEEN CAKES)
QUEEN CAKES
SWEET SCONES
PLAIN SCONES
NUMBERS IN ☐ ARE B.Th.U.
GAS CONSUMPTION (MAINS, TOP FLUE OUTLET = 100)
TOP FLUE OUTLET
FALSE CROWN TOP FLUE OUTLET
SYPHON FLUE TOP FLUE OUTLET
FALSE CROWN & INVERTED SYPHON FLUE BOTTOM FLUE OUTLET
BOTTOM FLUE OUTLET

Fig. 7.

A small temperature gradient of 15° F. was found between the top and middle zones and there was a tendency for the top flues with and without false crown to have a slightly greater temperature difference.

There was a much greater difference between the middle and bottom zones, the top flue arrangements having a temperature difference of about 70° F., while the other arrangements had a difference of about 55° F. This confirms the experiments of Forshaw (5), but appears to be contrary to the general view that bottom flue ovens have a cooler zone at the base. This may partly be due to some bottom flue ovens having the burner above the base plate, any region below the burners being heated only by radiant heat from the top of the oven, and partly to some other factor, such as angle of burner, which we have not investigated.

FLUE SYSTEMS	PLAIN SCONES MARK 9	SWEET SCONES MARK 7	QUEEN CAKES MARK 6	MADEIRA CAKE 6.7.8.½ 24 QUEEN CAKES MARK 4	MADEIRA CAKE 5.5.8 RECIPE MARK 4
	T B	T B	T B		
1. NORMAL (BOTTOM) FLUE	☐ ☑	☐ ☑	☐ ☑	☑	☐
2. TOP FLUE	☒ ☒	☒ ☒	☒ ☒	☑	☒
3. TOP FLUE & FALSE CROWN	☒ ☑	☒ ☒	■	☒	☒
4. FALSE CROWN - SYPHON BOTTOM FLUE	☒ ☒	☒ ☒	☒ ■	☑	☑
5. INVERTED SYPHON - TOP FLUE	☒ ☒	☒ ☒	☒ ☒	☒	☑
CENTRE OVEN TEMP. °F	489	423	391	325	325

☐ PASS ☑ NEAR PASS ☒ FAIR ■ FAILURE T TOP TRAY B BOTTOM TRAY

G.L.C. 'I' COOKER.
VARIATION OF COOKING QUALITY WITH DIFFERENT FLUE SYSTEMS.

Fig. 8.

Fig. 8 shows the result of the scoring of cooking quality, and the following conclusions may be drawn:

(1) There is no striking difference in cooking quality between the various flue systems.

(2) The bottom flue gives the most economical cooking and best cooking quality.

(3) The top flue produced the second best cooking quality, but is the least efficient.

(4) Both the top and bottom flues give quicker cooking than the other three systems.

(5) The syphon flues are similar and showed marked lack of bottom heat on the top tray.

(6) The top flue with false crown gave the lowest cooking quality and some lack of bottom heat on the top tray.

Draught.

It is well known that draughts may affect the cooking quality in an oven, and the latter is of unsatisfactory design if it is necessary for the housewife to keep doors and windows tightly closed during cooking. The draught may affect the delicate balance of hot gases passing through the oven by its effect on the air inlets or flue outlet, and accidental openings have an increased effect. Increased convection loss from the surface of the oven will be slight at the velocities experienced in kitchens.

A current of air playing on an oven has direction, speed, and temperature—the latter being of little importance. Cooking tests with three different types of oven have shown that a draught directed at the flue outlet may have marked effects on the cooking quality. Although the normal position of the cooker with its back to the wall offers some protection, it would be advantageous if the flue outlet were protected as far as possible. A draught directed at the front of the oven also has a marked effect, although the same speed directed at the sides has little effect. The experimental draught had velocities ranging from 5-10 miles per hour, and are probably greater than normally met, measurements of appreciable draughts in kitchen giving velocities of less than 1 mile per hour.

Door Fit.

Accidental openings appearing during assembly or use may increase the flow of flue gases through the oven, and, what is probably more important, alter the direction of flow. The effect is more marked with bottom flue outlet ovens and depends on the position of the opening; those at the top have the maximum effect, while openings below the flue outlet may have no effect at all. Leakage is most likely to occur round the door, and may be due to partial closing owing to a faulty latch, or the inability of the consumer to close the door properly or to warping of the door or door frame.

Cooking tests were carried out in a thermostatically controlled bottom flue cooker, the door of which was kept open by the insertion of distance pieces. The effect was small up to $\frac{1}{8}$ in. opening, but with larger openings the cooking time required increased considerably and the results were not so good. The gas rate does not appear to be appreciably affected, so that the cooling of the thermostat rod must be small. Owing to the possible effect of draughts, however, the gap at any one point at the top or sides should not be more than 0·02 in.; this should be measured when the door is hot as tests indicate that the gap decreases under this condition. Pressed steel construction, with its increased flexibility, may give a larger opening when tested with a feeler gauge, but close examination will probably show that the gap perceptibly closes when the gauge is withdrawn.

(To be continued.)

The Sale of Coke for Domestic Use

From a Paper read before a meeting of the Midland Junior Gas Association on Feb. 3.

by
G. J. BAKEWELL,
of Birmingham.

The use of small coke as a household fuel is growing rapidly.

It is common experience that the behaviour of a fire depends to some extent upon the prevailing atmosphere. This applies particularly to the lighting period and the early stages of combustion, when the chimney is comparatively cool and the draught therefore slight. Providing it is used correctly, small coke will burn in almost every type of grate that is efficient in the burning of coal. It is true that it is a little more difficult to ignite than soft coal and when alight requires more frequent replenishing than does a coal fire, but it has much in its favour to commend its more general use.

Experiments have proved in various grates that the depth of small coke has a great influence on the combustion of the fuel. Where a gas point is not available, we have found the following method of ignition most successful:

1. Cover the bottom of the grate with a quantity of coke.
2. Upon this place paper which has been twisted and pressed into firm balls.
3. Then put sticks of wood lattice pattern (using rather more than for a coal fire) upon the paper.
4. Next put on any cinders left from the previous day's fire—cover the whole with a good supply of small coke.
5. Roll a newspaper torch fashion, ignite it, and push this into the throat of the flue. Allow it to burn away, and then ignite the paper under the coke fire.

If a "draw-tin" is available, this should be used, and a glowing coke fire will quickly be obtained. For the best results the fire should not be allowed to burn too low before replenishing.

Coke which is intended for use in open grates should be delivered in a fairly dry state. It may be beneficial from the customer's standpoint if it is sufficiently damp to hold any dust which would otherwise be created when tipping from the bag into the bin or cellar. If, however, it is charged with moisture considerable difficulty will be experienced in ignition, and also the radiant efficiency will be seriously impaired. The delivery of such fuel is likely to create prejudice against it, especially when it is being tried for the first time. The obviously remedy is for the suppliers to take the necessary steps to ensure that shelter is provided during storage and transport of the coke.

It is also necessary to state here that the range of size employed requires particular attention; if the coke is too small, difficulty is encountered both in its ignition and in maintaining a bright fire, the former due to the smothering of the lighting material by the small pieces of fuel and the latter due to the reduction of the air passing through the fuel bed owing to the close packing of the coke.

Again, with coke which is too large for the particular grate and condition of draught, ignition and combustion are unsatisfactory because of the amount of heat required to raise the temperature of the pieces sufficiently for them to support independent combustion, and the smaller ratio of surface area to the volume of coke.

Stimulating Public Interest.

Probably the most difficult question in connexion with the sale of coke is how to increase satisfactorily the interest of the public. Perhaps we may be allowed to try to explain how this question was tackled by the City of Birmingham Gas Department. In this city, for many years prior to the war small coke suitable for household consumption in open grates, &c., has been available to the public. During the early part of the year 1925, however, the Chief Coke Salesman decided to inaugurate a regular delivery system of small quantities of coke, this being termed solid smokeless fuel.

Publicity was given to this venture by enclosing suitably worded literature with the quarterly gas accounts, &c. Advertisements in local daily and weekly newspapers, theatre programmes, and cinema slides were also used, advising all and sundry that solid smokeless fuel suitable for household use could be obtained, delivered in quantities of 1 cwt. and upwards, from the Gas Department. Quite a number of trial orders were received; these were entered on a special card index system and in due course the coke was delivered.

How would the customers react to the burning of coke and would they know how to use it to the best advantage? Two domestic coke salesmen were appointed, and after receiving training and instruction in the properties and characteristics of coke were sent out to visit the various customers as shown on the order card index system. They carried with them small travellers' bags containing samples of small coke, breeze, &c.

The interviews with the customers were instructive and enlightening. One of the difficulties we found was that there were so many different types of grates and differences in draughts as between one house and another. Small coke that burnt well in some houses did not give the same performance in others. Many people simply used the coke as a secondary fuel in supplying "backing" to coal fires. Others treated it as if it were made of gold, putting a few pieces on the gaps between the lumps of coal. To many it was a source of great satisfaction; with others, owing to incorrect use, it created an atmosphere of irritation. We even called on one customer who, although he expressed himself as being quite satisfied, did not wish to give an order for a further delivery. On being pressed for an explanation, we were invited inside the house. We followed the customer into his garden and, quite puzzled, we awaited his remarks. Without a word, he pointed to the garden path, and there we found the remains of his trial order for household coke. He was quite nice about it, but said that it simply would not burn, but that it made a splendid path. On being asked if we could prove to him that he was wrong, he agreed to a demonstration.

We gathered sufficient fuel from the path, and to his astonishment had a glowing, self-supporting fire within half-an-hour. Needless to say, he gave a repeat order.

Notwithstanding these difficulties, however, the idea caught on and people began to order regularly. At the various local exhibitions small coke was shown burning in ordinary ranges and open grates. For the sake of convenience, ignition was obtained by means of a piece of ¼ in. gas pipe suitably connected to a gas point.

With the public displaying greater interest, more domestic salesmen were appointed and a system of regular visitation to customers was instituted. Fresh ground was broken when householders were canvassed on the house-to-house principle.

The grouping of orders received from this method made for easier delivery. Until the year 1926, open fire grates specially designed for the burning of coke were few and not generally known to the public. The majority of the customers started their fires with paper, wood, and coal, putting the coke on only when the fire was well alight. In 1926 certain grate manufacturers put on the market gas-ignited coke grates, specially constructed for coke burning. Their adoption by the public was at first slow. However, improvement in design and finish increased the demand and general interest. More manufacturers entered into this new field of development, and their appliances were shown at the various exhibitions with great success. Public interest developed rapidly, and with the increased popularity of the gas-ignited coke grates, canvassing for coke orders, &c., received greater stimulation.

In the fixing of gas-ignited coke grates we encountered various difficulties, usually due to defects in the existing flues. Pockets or ledges caused, and still cause, endless trouble. While it does not always prove the case, generally speaking,

dissatisfaction sooner or later will arise unless these cavities or ledges are properly bricked over. A chimney flue should have no other opening into it but that of the one necessary for the fixing of the coke fire. All other openings, if any, should be sealed. Apart from the risk of unsatisfactory operation when two or more openings exist in a flue, there is the danger of downdraught if the surplus openings are not permanently closed, resulting in the discharge of the products of combustion into the apartment.

From time to time this question is asked by prospective customers: Is the use of coke a potential source of danger when it is used against a copper boiler?

Probably they have heard from a plumber or domestic engineer that the constant use of coke would facilitate external corrosion, so that the boiler would leak. In the absence of any known data, the Birmingham Gas Department ultimately concluded that the matter was of sufficient importance to justify a complete test. This was carried out in co-operation with the Copper and Brass Extended Uses Council, various tests being made over a lengthy period, using copper boilers of varying degrees of thickness.

The boilers were fired with coke made specially and unduly high in sulphur content in order to make the tests very severe, and also hot water was frequently run-off and the fires let down to give external condensation every chance of causing corrosion. Conditions far more severe than those of the ordinary kitchen were thus set up. The tests were continued for 195 whole days (approximately 12 hours each) and 39 half days.

The boilers were duly dismantled, and it was found that no boiler was seriously corroded, but the one tested with coal showed more of a very slight surface corrosion than any of those used with coke, although three of the latter had been in use 206 days longer, and the test had been made more severe in its potential corrosion activity than ordinary coke.

In actual heating practice it has been found that the regular use of coke tends to remove from the boiler heating surface the hard carbon scale deposited by the tarry products evolved from coal burning, thus permitting a quicker transfer of heat from the burning fuel to the water inside. The insulating effects of this carbon scale is entirely eliminated if coke only is used as fuel.

Domestic Hot Water Boilers.

For small boilers the most economical fuel is inch coke nuts. Small coke is much more suitable for the medium type of boiler. The best results are obtained if the fuel depth is maintained and the dampers so arranged to permit only a minimum air inlet and outlet; fed in this manner the fire can be left unattended for many hours.

Inch coke nuts as a fuel for the various types of closed stoves are becoming very popular with the public. They are also being used to-day with great success in the "Aga" and similar types of closed cooking ranges.

The public are generally willing to accept a smokeless substitute, providing that the fuel which is intended to supplant coal gives an equally good performance in ordinary domestic grates. We know that the manufacture of coke still needs further improvement, but the public are not interested in the manufacturing difficulties. Their ideal is a fuel which is smokeless, clean to handle, inexpensive, easy to ignite, burns vigorously but not wastefully, is dense and compact so that it requires a minimum of storage space, having the maximum heating content with a very low ash content.

There is reason to suppose that in the future some means of standardizing the marketing of household coke will be adopted by various gas undertakings. The various Coke Associations and Committees which are in action are fully alive to the many problems to be overcome. They realize that there is a large demand for a smokeless fuel which can be easily ignited with paper and wood or gas poker and which will burn freely in the ordinary type of grate. The day is probably not far distant when quality and quantity will come together in happy alliance.

Discussion.

The PRESIDENT (Mr. E. T. Pickering) said his own experience confirmed Mr. Bakewell's statement that one of the most difficult problems in the sale of coke was to gain the interest of the public. It was a tribute to the attention which gas undertakings were paying to the manufacture of coke that it could now be used in almost any type of grate. There was no doubt that the new types of coke grate were definite labour savers, and not only was the consumer benefiting by the use of the modern coke grate, but the gas undertakings were also getting the advantage of the gas load, the average gas consumption with each grate being equal to the gas consumed by a one mantle burner two hours a day for eight months of the year. He asked Mr. Bakewell what he thought was the best method of igniting the coke in a grate fitted with a gas burner.

Mr. A. W. ATTWOOD (Coventry), in proposing a vote of thanks, said that for domestic back boilers coke was undoubtedly the best fuel for keeping the boilers clean, provided the correct size of fuel was used.

Mr. W. N. SMIRLES (Birmingham), in seconding the vote, said that no doubt one of the difficulties was in convincing householders of the economy of using coke, and certainly one advantage to be put forward was the saving effected by having clean chimneys.

Mr. H. G. BROADBRIDGE (Leamington) said Mr. Bakewell had referred to the use of "small coke," and he asked for the size of this material. He referred to the difficulty of many householders in storing coke because of its bulk, and asked if it were possible to burn it in an ordinary "Devon" grate.

Mr. J. H. WAINWRIGHT (Halesowen) asked for the various sizes of coke offered by the Birmingham Gas Undertaking for domestic use.

Mr. H. J. WHITE (Birmingham) asked what action coke had on an iron boiler as compared with a copper one.

Mr. F. J. BENGOUGH (Birmingham) said that often the works were blamed for dirty and dusty coke when it was frequently due to the fact that a consumer had delivery after delivery of coke placed in the same receptacle, and when he eventually happened to get to the bottom of the stock and found an accumulation of dust, he attributed this to the last consignment delivered. He thought it would be a good idea if gas undertakings sold with the coke grates a draw-tin of attractive appearance which would assist in the ignition of coke and enable the consumer to obtain a bright fire in the minimum time.

Mr. D. W. G. SCOTT (Birmingham) asked what was recommended to consumers who wished to burn coke in a well grate. He had tried firebricks which had the effect of narrowing and deepening the fuel bed, and by this means it burned coke quite satisfactorily.

Mr. PRICE (Coventry) asked whether the Department inspected all existing fire grates before a coke fire was fixed.

Mr. PARKER (Leamington) referred to the difficulty of maintaining an adequate delivery service, and said in Leamington they had got over this trouble by instituting C.O.D. sales.

Mr. E. C. ROYALL (Dudley) asked whether horizontal coke burned as well in a modern coke grate as vertical coke.

Mr. H. WYNNE (Burton-on-Trent) asked what Mr. Bakewell considered was the correct amount of moisture in coke for efficient burning.

The Author's Reply.

Mr. BAKEWELL, in replying to the discussion, said the igniting of a coke fire depended largely upon the householder. Many people insisted upon filling up the grate with coke before lighting the gas, but in his opinion the correct method was to leave the gas jets burning for a few minutes in order to warm up the chimney and then put on the coke. By this method the coke was ignited more rapidly.

When first visiting a house in regard to the installation of a coke fire, it was the practice to examine the flue, and from this examination—within certain limits—it could be ascertained whether the grate would burn coke satisfactorily or not. In Birmingham, many cases of bad building had been found, especially in the cheaper class of houses, and while it might be possible to burn coal, if there were a ledge in the chimney, smoke would be thrown into the room, and obviously, before installing a coke fire the pocket in the chimney had to be filled in. If a grate would burn coal satisfactorily, the chances were that it would burn coke equally well, but there were cases where it would not be possible to burn coke unless the whole of the old grate was removed.

In his opinion, a well grate would burn coke as well as in a coke grate provided the fire was laid properly, and in this connection he suggested that about a dozen pieces of larger coke should be placed at the bottom of the grate, paper and wood placed on this, and the fire finally built up with the smaller coke. He agreed that the question of the storage of coke was a very vexed one owing to its bulk compared with the same weight of coal, and in the modern house the only way of overcoming the trouble was either to install a proper coke bin, or to divide the coal-place into two, using one half for coal and the other for coke.

In Birmingham, ½ in. to 1 in. coke was recommended for use in small boilers, 1 in. to 2 in. was termed small household coke, and above 2 in. large coke. It had been proved that coke above 1 in.

and through 2 in. was the best size for household use. With regard to the amount of coke consumed by a modern coke grate, it had been found that if used for a normal period during each day of the week, 1½ cwt. of coke was consumed.

Two factors which effected saving by the use of a coke fire were the ease with which it could be lighted and the speed with which it gave off its heat. With a coal fire there was a long period before any appreciable heat was radiated into the room, and these facts should be taken into consideration when comparing the costs of the two fuels. Coke had no corrosive effect on copper boilers, and it had yet to be proved that it had any ill-effect upon iron boilers.

With regard to the point made in connexion with complaints of dust in coke, he said that, in Birmingham, in such instances it was always pointed out to the consumer that as the coke was carefully screened it would be impossible to accumulate a large quantity of dust from one delivery. He was of opinion that artistically designed draw-tins would shortly be on the market in a variety of styles to suit various grate openings.

With regard to the fixing of bars to a well grate, he thought that if this had to be done in order to burn coke, then it would be just as economical to fit a proper coke grate.

He stated that many people asked for a coke fire to be fitted owing to the fact that they got a down draught with a coal fire, and it was, therefore, necessary to inspect all existing grates and chimneys before recommending the fixing of a coke fire. Referring to the question of the use of horizontal or vertical coke in domestic grates, he said with the exception that it might take a little more gas to ignite it, horizontal coke was as good as, if not superior to, vertical coke, as it lasted longer. He suggested that the moisture in domestic coke should not be greater than 5% to 7%.

Fischer-Tropsch Coal Spirit

Improvement by Cracking

The improvement by cracking processes of Fischer-Tropsch coal-spirit was the subject of a Paper by Messrs. C. Stribling Snodgrass and Michael Perrin delivered at a meeting held under the auspices of the South Wales Branch of the Institution of Petroleum Technologists, in association with other local scientific societies. The following is an abstract of the Paper:

Reference was first made to the two principal methods at present in use for the synthesis of liquid hydrocarbons—viz., hydrogenation and the Fischer-Tropsch process—comparing certain advantages and disadvantages of the two processes. A brief résumé was given of the basic principles of the Fischer process as first installed on a large scale at Oberhausen, Germany.

The raw material for the process consists of a mixture of carbon monoxide and hydrogen in the ratio of 1 to 2 by volume and is conveniently referred to as synthesis gas. Ordinary water gas appears to be the most economical source of synthesis gas. Thus the process differs from hydrogenation in that the starting point is coke and not coal, so that the valuable by-products from the coking of coal must be considered as an asset on the credit side of the Fischer process. A point of interest here is that the gas producers at Oberhausen were designed by a British firm.

The crude synthesis gas is cooled and treated in a two-stage purification plant for the removal of sulphur. In the first stage, inorganic sulphur is removed by usual gas-works practice at normal temperatures; in the second, organic sulphur is removed at elevated temperatures. The synthesis gas is allowed to circulate within the contact chambers where synthesis of hydrocarbons takes place, in the gaseous phase, over a catalyst which may consist of a cobalt salt distributed on a Kieselghur foundation. The reaction takes place in two stages, the temperature and pressure being carefully controlled. This reaction is strongly exothermic and the heat released is immediately removed by the production of steam at constant temperature and pressure.

The major portion of the hydrocarbons and all of the water formed in the synthesis are removed in the liquid state by passage through suitable condensing and cooling equipment. The gas leaving the condensing equipment still contains a quantity of low-boiling hydrocarbons, the bulk of which is removed in an activated carbon plant. Two other gas streams are taken to the activated carbon plant, one consisting of fractions known as gasol, and the other a lean gas consisting of CH_4, N_2, H_2O, CO, and CO_2. From the gasol, butane and propane may be recovered or it may be passed to the cycle-gas system of the cracking plant for conversion into useful liquid hydrocarbons.

Since the first cracking tests were carried out in 1935 certain improvements have been effected in the Fischer process itself. The introduction of increased pressure conditions in the second stage has considerably modified the quality of the liquid products, particularly in the direction of increased solid wax production, while, at the same time, bringing the actual yield of hydrocarbons closer to the theoretical figure, which is approximately 170 grammes/m³ of synthesis gas *plus* 18% of inert gases. Two years ago the attained yield stood at 100-105 grammes/m³, but this has been successively increased and is now stated to have reached the figure of 120-130 grammes/m³.

Cracking of Synthetic Oil

Although in general spirits distilled from coal are characterized by high anti-knock values, the Fischer-Tropsch products are substantially the reverse. Moreover, the refractory nature of Fischer crude oil necessitates repeated recirculation through the cracking plant before cracking is completed. Consequently, a cracking system to convert the synthetic products into high-grade motor spirits was a matter of vital importance for the success of the Fischer process. After exhaustive tests of the relative merits of the existing cracking systems the True Vapour Phase process was selected by the owners of the Fischer process, and adopted for the first plants in Germany and France, a further instance of the part which British firms have played in the development of the Fischer-Tropsch process.

The True Vapour Phase process was found to give the best yields of maximum octane number spirit, and chiefly due to the absence of coke formation in the tube-still heaters, long uninterrupted periods of plant operation can be confidently anticipated. Furthermore, if required, the gasol fractions may be injected into the cycle-gas system. This is an important feature of the process in that it produces additional liquid hydrocarbons, thus increasing both yield and octane number of the finished spirit. Up to now the production of motor spirit of octane numbers from 70 upwards has not been commercially exploited in Germany because a cracked product with an octane number of 63-64 is quite sufficient for the present purpose of blending with benzole or alcohol in accordance with Government regulations.

The outstanding feature of the True Vapour Phase process lies in the heating of the oil vapours by intimate contact with a carrier-gas which has been heated to a temperature somewhat above that required for cracking the vapours. The cycle-gas, which is a product of cracking within the system, operates in a closed cycle and its character and temperature may be varied for different types of charging stocks, and the required specification of the finished product.

The conventional cracking plant of to-day may only be considered as a complete unit when a reforming plant and a polymerization plant have been added, both for the purpose of improving the octane number of the product. A True Vapour Phase plant is, however, complete without this additional equipment because the basic principle of the system is such as enables these functions to be performed within the plant itself. This special feature has proved of considerable importance in processing synthetic oil.

Results of Cracking.

Cracking Process: True Vapour Phase.
Charging Stock: Fischer-Tropsch Synthetic Crude.

Charge	Reduced Crude.			Untopped Crude.	
Specific Gravity	0·769			0·725	
Cracked spirit—					
Yield, % by weight	81	75·5	65·2	70·6	65·2
,, % by volume	88	81·8	73	72	68·3
Specific gravity	0·708	0·710	0·688	0·711	0·692
Endpoint, ° C.	200	197	168	197	160
Octane No. (motor method)	62	68	75	67	73
T.E.L. required to raise Octane No. to 80 c.c./gall.	—	3·5	1·3	3·7	1·7

Women's Gas Council

Bradford Branch Function.

The annual dinner, whist drive, and dance of the Bradford branch of the Women's Gas Council took place on Feb. 18, at the New Victoria Ballroom.

The event was highly successful, a large number of members and friends being present, and they were welcomed by the Chairman of the Council, Mrs. N. Cunningham.

The guests included the Lord Mayor and Lady Mayoress (Alderman H. Hudson and Mrs. Hudson), the Deputy Lady Mayoress (Mrs. Jessop), Alderman F. J. Cowie (Chairman of the Gas Committee) and Mrs. Cowie, Mr. Alton Ward (Deputy-Chairman of the Gas Committee), Mrs. Grundy, Mr. and Mrs. J. W. Flanagan, Mr. G. E. Currier (Gas Engineer and Manager) and Mrs. Currier, and Mr. H. Johnston (Deputy Gas Engineer) and Mrs. Johnston.

The prizes were presented by the Lady Mayoress, who is the President of the Bradford branch.

COMPANY MEETINGS

The Bournemouth Gas and Water Company

The One Hundred and Seventeenth Ordinary General Meeting of the Bournemouth Gas and Water Company was held at the London Offices of the Company, 48, Copthall Avenue, E.C. 2, on Friday, Feb. 25—Mr. WILLIAM CASH, J.P., F.C.A. (Chairman of Directors), presiding.

The SECRETARY (Mr. William Cash, Jnr., M.A., F.C.A.) read the notice convening the meeting, together with the minutes of the previous Ordinary General Meeting, which were confirmed and signed. The List of stockholders was duly sealed. The Report and Accounts for the year ended Dec. 31, 1937, were taken as read.

THE CHAIRMAN'S ADDRESS.

The CHAIRMAN, in moving the adoption of the Directors' Report and Statement of Accounts, said this once more gave him the opportunity of addressing a few remarks to them on the accounts and the report. He wanted to say, as he had been asked to do, that Sir George Jessel was away abroad and he was therefore unable to be present that day and offered his apologies.

They would see in the first paragraph of the Report that the sales of gas showed a satisfactory increase over the year 1936. As a matter of fact, that increase was at the rate of just over 1½%, equivalent to 45 million cu.ft. of gas, which, in view of the fact that 1936 was Leap Year and therefore the year under review was one day shorter, was a satisfactory increase. It might interest them to know, as justifying taking over of some of the outside undertakings, that the increase for the year at Ringwood and Lymington, taking these two places together, showed a figure of 23%, which demonstrated how much these places benefited by accepting the advantages which the Bournemouth Company was able to offer them as regards prices and services.

The number of consumers had gone up by 2,976 as far as gas was concerned, but the consumption per consumer still showed some inclination to drop—due partly, he thought, to the smaller types of houses now being put up and also to the efficiency of the apparatus which they were now selling. There had been some discussion recently on the question of hire-purchase by public utility undertakings of appliances, and it might interest them to know that last year there were 6,700 agreements entered into for appliances, having a value of £77,000. This was about 58% of the total sales, or, in other words, more than half their total sales from the showrooms were covered by hire-purchase agreements. The number of agreements which were not carried to full maturity—in other words, where the apparatus was returned because of death and things of that sort—was relatively very small.

The number of water consumers was up by 1,073, which indicated that that side of their business was still growing and that building was still going on.

The next paragraph in the Report related to the agreements into which they had entered with the Brockenhurst Gas Company and the Wareham and District Gas Company, Ltd.—two quite small undertakings but where, following the same policy as they had done with the other small neighbouring companies, they thought that the advantages of price for gas and for the services they could render were suitable and justified this proposal. The Company's Bill for these and other purposes had now been passed by the unopposed committee of the House of Commons, so that it looked as though they would get the permission of Parliament to their proposals without serious, if any, opposition.

Capital Account.

Turning to the Capital Account, it would be seen that they had issued during the year £50,000 of 4% debenture stock at 101%, while they had issued by tender £50,000 of maximum dividend stock at the price of 161¼%. In the capital expenditure account, the expenditure, apart from mains, was not very great and chiefly consisted of the acquisition of the freehold of the Ferndown showroom and the extinguishing of certain wayleaves. The principal expenditure was, as usual, the substantial sum spent on mains laid. The mains laid amounted to 32½ miles for gas and 11½ miles for water.

They were still following their practice of trying to assist their gas consumers by making house-to-house inspections of their apparatus and adjusting it so that it might be used to the best possible advantage. They made nearly 6,500 house inspections last year, and there were over 21,000 cases where apparatus was adjusted. He was sure their consumers appreciated that service.

With regard to the Revenue Account, he would take gas first as it was their largest department. They set out in the Account the comparative figures for the previous year, so he really need not say very much about them. They had used about 8,000 more tons of coal and rather less oil, as they would see from the statistics, and the cost of the two together was up by £2,900. Repairs and Maintenance of Works was heavier, and, of course, that must vary from year to year; that item showed an addition to their expenses of £6,307. Repairs and Maintenance of Cookers and Fittings showed a very substantial increase of £11,900; they were modernizing all their apparatus and withdrawing anything that was not up-to-date. He did not think he need take them in detail through the remainder of their expenditure.

It would be noticed that they had put to Special Purposes Fund this year £5,000 as against £15,000 in the previous year. If they would be good enough to look at the Special Purposes Fund, they would see that it was now at such a substantial figure that they did not think it necessary to go on adding to it at the rate at which they had done in the past. The Fund now amounted to over £140,000. So far as water was concerned, they had made a corresponding contribution to that Fund of £2,500. While on the matter of the Special Purposes Fund, they would see a debit of £2,792 in respect of air raid precautions. In addition to that amount, there would be some further expenditure on that account yet to come; they were doing a great deal in the direction of organizing and training their men to meet any necessity that might arise in the unfortunate event of foreign attack.

Going back to the Gas Revenue Account, it would be seen that receipts for gas were up by £9,600. Taking rental of meters, cookers, and fittings together there was an increase in the total sum of £1,700. The profit on fittings still showed a decrease, mainly due to the fact that they had been doing more canvassing work in 1937 than in 1936; therefore, the profit was less. Residuals had done well, there being an increase of £22,000. Summing up the position, their receipts were up by £29,700, while their expenses were up by £19,481—really by £29,000 because of the difference in the charge for Special Purposes Fund. Roughly, the increased profit on the year was £10,245 so far as gas was concerned.

There was little to which he need draw their attention in regard to Water Revenue. Water rental was up by some £3,000, while the rental of meters was up by £120.

Profit and Loss Account.

Turning to the Profit and Loss Account, the total profits of the two combined undertakings were up by £9,400. They would, if the recommended dividends were authorized, add to their carry-forward the sum of £1,089, comparing with the sum originally brought forward as from the last Profit and Loss Account. They would see on the left-hand side that the charges for income-tax were up. They had made some small reserve in view of the fact that next year they would have to pay on rather larger profits than before.

They might be interested to hear one or two general observations. There was a new Factories Act coming into force in July which contained special provisions in regard to gasholders and their examination. It also dealt with such things as the need for special care in regard to vessels under compression, the examination and security of lifting tackle, and certain other minor things. Of course, the Bournemouth Company had always carried out its duties in this connexion; but they proposed, in view of the statutory obligations, to cover some of this inspection and insurance with outside parties, whereby they would get the advantage of independent reports which would greatly assist Mr. Moon from time to time.

As far as coal was concerned, Mr. Cash could only say what other Chairmen had said at recent meetings—that they were still concerned with the way in which the Coal Bill stood to-day with its mainly uncontrolled monopoly in the hands of the coal owners. Their Company's present contracts ran to the end of the current year, but the price of gas in future must depend on the coal, and that affected the consumer. In addition to that, as they knew, all materials were up, while wages had also increased.

In conclusion, he would like to say a few words in regard to their water supply, particularly in view of the fact that this subject has been so much under public discussion in the last few months. As was made abundantly clear in August, 1936, the outbreak of typhoid in Bournemouth and the neighbouring towns was in no way due to the public water supply. The obligation of the Company was to afford a supply of pure and wholesome

water suitable for domestic purposes. It was, of course, of vital importance for health resorts such as Bournemouth to fulfil this obligation.

The supply had always been under continual and regular tests and appropriate treatment. Many years ago the Company appointed a resident chemist, and for some considerable time a number of bacteriological and chemical examinations have been made every day at various points. The whole supply was always carefully chlorinated. In addition, samples were taken simultaneously every month and submitted to tests by the Company's chemist, two separate expert public analysts in London, and a third analyst acting on behalf of the Bournemouth Corporation; the results of these tests were compared on each examination. The public analysts employed by the Company were experts of outstanding reputation, and the stockholders would be pleased to know that the results were all entirely satisfactory.

Finally, the Chairman said he would just like to say a word or two as regards the position disclosed by the balance-sheet. Investments, which had a book value of £236,000, had a market value on Dec. 31 last which showed a surplus of £22,400, while there was also a surplus on the Pension Fund investments shown on the other side of the balance-sheet, and taken on the same basis, of another £32,000. It would be observed that their Reserve Funds were substantial and stood at an amount which they regarded as adequate for their purposes.

The CHAIRMAN then formally moved the resolution for the adoption of the Report and Accounts, which was seconded by Sir CHARLES MORGAN, C.B.E., M.Inst.C.E. (the Deputy-Chairman), and carried unanimously.

Dividends.

The CHAIRMAN thereafter moved that dividends be declared in respect of the half-year ended Dec. 31, 1937, at the following rates per annum:

6% on the preference stock,
7% on the maximum dividend stock, and
9½% on the standard 5% (sliding-scale) stock.

This was seconded by Sir JOHN J. WITHERS, C.B.E., M.P., and unanimously agreed.

Re-Election of Directors.

Sir CHARLES MORGAN moved the re-election of Mr. William Cash and Sir George Jessel, Bart., being the two Directors retiring by rotation, remarking that no words of his were necessary to recommend this resolution to the meeting.

The proposition was seconded by Lieut.-Col. H. W. WOODALL, C.I.E., M.Inst.C.E., and carried unanimously, the Chairman briefly returning thanks.

Vote of Thanks to Staff.

The CHAIRMAN said that he had not yet referred to the work of the Officers and staff of the Company. They were extraordinarily fortunate in their Officers and staff. He had mentioned before how well their Engineer and General Manager, Mr. P. G. G. Moon, served the Company; he had excellent qualifications as an Engineer, Chemist, and Administrator. In the autumn of last year they had appointed Mr. Stredwick to assist him. All the staff and workmen were enthusiastic supporters of the Company, working happily together under the co-partnership scheme, and the stockholders should be indebted to them for the results which had been consistently good over a long period.

Mr. W. B. PATON seconded the vote, remarking that he had had occasion to see some of the staff at work, and he had been struck by the happy conditions under which they worked.

In acknowledging the vote, which was heartily accorded, Mr. P. G. G. Moon expressed appreciation of what had been said, observing that it was very nice to be thanked for something one liked doing. So far as the staff and workmen were concerned, he would like in their name to thank the meeting very sincerely. He was not going to claim that they were 100% efficient or 100% loyal—after all, they were only human—but he did claim that one would have to go a long way to find a more loyal or more efficient staff than they had at Bournemouth. He was rather proud of the cheerfulness of their staff; when it was realized that they had 1,600 men who were always looking on the bright side of things it was a considerable tribute to the conditions under which they were working—conditions which the stockholders had been able to provide by way of co-partnership and pension funds. The working conditions of the staff were always very much in the minds of the Board, and one obtained good work in that way. No fewer than 800 of the staff were stockholders in the Company, and every one would greatly appreciate the cordial vote of thanks which had been given to them.

Re-Election of Auditor.

On the proposition of Mr. J. TAYLOR, seconded by Mr. J. N. MASON, the retiring Auditor, Mr. W. B. Paton, F.C.A., was reappointed.

EXTRAORDINARY GENERAL MEETING.

An Extraordinary General Meeting followed for the purpose of—

(1) Rescinding the Resolutions passed from time to time by the Proprietors authorizing the Directors to raise Additional Capital in accordance with the provisions of the Company's various Acts and Orders so far as any Capital shall remain to be issued under the authority of such Resolutions or any of them, and—

(2) Authorizing the creation of the Additional Capital in accordance with the provisions of the Company's Acts and Orders, 1873-1935, and the issue of such an amount of Stock as with the premiums thereon will not exceed the sum of £126,007 10s. 3d., at such times, in such amounts and manner, and on such terms and conditions, and with such rights and privileges as the Directors shall think fit.

(3) Rescinding the Resolutions passed from time to time by the Proprietors authorizing the Directors to exercise the Borrowing Powers of the Company so far as any money shall remain to be borrowed under the authority of such Resolutions or any of them,

and

(4) Authorizing the creation of Debenture Stock under the Company's Acts and Orders, 1873-1935, to an amount not exceeding £177,785, and that such Debenture Stock be issued at such times, in such amounts and manner, and on such terms and conditions, and with such rights and privileges as the Directors shall think fit.

The CHAIRMAN, in moving the resolutions, briefly explained the reasons for these proposals, which had the effect of simplifying the powers of the Directors in connexion with the raising of additional capital.

The proposition was seconded by the DEPUTY-CHAIRMAN and carried unanimously.

The meeting terminated with a hearty vote of thanks to the Chairman and Directors, which was briefly acknowledged by Mr. Cash.

Mid Southern Utility Company

The Ordinary General Meeting of the Mid Southern Utility Company was held on Feb. 24 at the Company's offices, South Farnborough.

Mr. Thomas A. Braddock (Chairman of the Company), who presided, said: Before proceeding to the general business of the meeting it is my sad duty to make reference to the death of Mr. Reginald William Edwards, our very highly respected Chairman and Managing Director, which took place on Jan. 15 last. I need not emphasize that it is to his outstanding capacity for leadership and foresight that this Company owes its present prominent position in the public utility world.

The Board has honoured me by electing me to the position of Chairman, a distinction which I fully recognize. Mr. C. P. Crookenden, F.C.A., has been elected Deputy-Chairman, and the vacancy on the Board has been filled by the appointment of Mr. A. V. Barraclough, M.I.Mech.E.

For the three undertakings the amount of authorized capital is £1,926,367 14s. 2d. Of this there has been received £1,770,753 0s. 2d. The net expenditure is £1,703,797 7s. 5d. Over the past year, deducting depreciation of £39,074 17s. 5d., the capital expended was £135,100 15s. 5d.

The net increase in sales of electricity compared with 1936 represented 40·5%. Additional appliances increased the load by 19,090 kW, compared with 19,819 kW the previous year.

You will expect me to say something about the general position in the electricity world, but I must be very reserved in my comments as the whole matter awaits clarification by a Government Bill which, although long expected, has not yet appeared. I can only say that you may rest assured that the Directors and Officers of the Company will continue to keep a very keen watch upon these important developments, and will strive to keep your Company in as prominent a position as possible. By the rapid expansion of recent years we have earned the right to be considered as one of the most progressive provincial undertakings, especially in the rational development of the rural areas.

The industrial use of gas in this area is limited, and we can report with some degree of satisfaction a decreased consumption, as compared with the previous year, of only 1·8%.

The following apparatus was added during the year: Cookers, 1,596; fires, 529; water-heaters, 878. The amount received from residuals represented nearly 58 (57·9)% of the cost of coal, compared with 59·5%. The yield in liquid products was 46·68 gallons per ton of coal carbonized, compared with 44·98 for the previous year.

The Directors desire to record their appreciation of the services of employees of all ranks.

The report and accounts were unanimously adopted.

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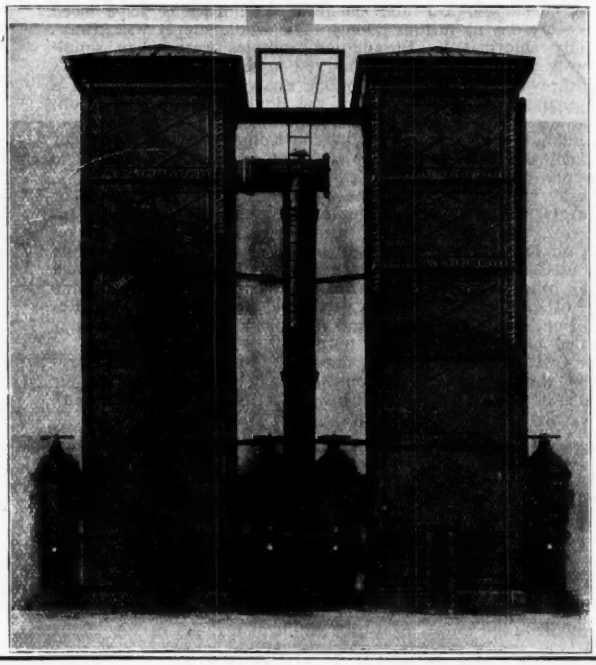

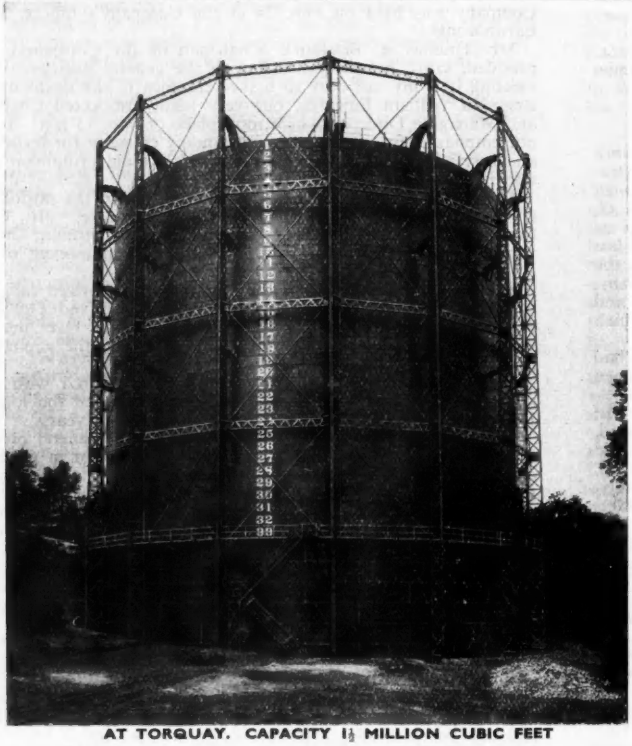

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Southampton Gaslight and Coke Company

The Annual Ordinary General Meeting of the Company was held on Wednesday, Feb. 23, 1938, at the Central Offices and Showrooms, 66, Above Bar, Southampton, at noon. Sir RUSSELL BENCRAFT, M.R.C.S.E., J.P. (Chairman), presided.

The Chairman, in submitting the Directors' Report, said:

I am sure you will all agree that the accounts for the year are satisfactory in every way. The acquisition of the Winchester Gas Undertaking took effect as from Jan. 1, 1937, and the figures shown in the revenue account relate to Southampton and Winchester combined in every case. The annual sales of gas now exceed 2,000 million cu.ft., and the number of consumers at Dec. 31 last was 74,376. The consumption of gas during the year showed an increase of 62,641,000 cu.ft. over that of the Southampton and Winchester Undertakings for 1936, the percentage increase being 3·06. I would point out that the increase in consumption from the Southampton Works for the last five years is over 22%.

The balance of net profit carried forward in the profit and loss account—subject to final dividends and bonus to the Company's employees—has been increased by £18,626—from £40,891 to £59,517, which includes £11,756, balance in the Winchester Company's profit and loss account at Dec. 31, 1936. The Directors are pleased to recommend that the additional ¼% dividend which has been paid for the last two years be paid again for the year 1937, making the final dividend on the ordinary stock 2¼% for the half-year and 5½% for the year. The additional ¼% dividend amounts to £1,876 7s., and under the Company's "basic price" provisions a similar amount will be payable to the Company's employees by way of bonus. Despite the increases in wages during the last two years, the rate of the bonus will be maintained at 1½% on wages and salaries paid during the year.

The shareholders will notice that the Company's reserves have been substantially increased, partly as a result of the acquisition of the Winchester Gas Undertaking. The total of the reserve special purposes, and renewal funds now amounts to £101,819 a compared with £77,084 a year ago, showing an increase of £24,735, or 32%.

Turning to the capital account, the sum of £1,706 under the heading of "property acquired" is for the purchase of several cottages in Bevois Street and Melbourne Street which directly adjoin the Company's works. The bulk of the expenditure for new plant is in connexion with the new purifiers which are almost ready for use. I would here mention that £11 807—nearly half of the total cost of the purifiers—has been charged to revenue account. A payment of £2,000 on account of a benzole plant at Winchester is also included in the capital charge. The recovery of benzole at Southampton has proved extremely profitable, the revenue derived from this product last year amounting to £13,030. The benzole plant at Winchester was started up last month and there is no doubt that it will materially assist in reducing the manufacturing costs at that works. The capital expenditure of £12,764 on new mains includes a long extension to Bartley and Cadman in the New Forest, where 180 new consumers have been supplied with gas. The total length of mains laid during the year was over 20 miles, and the number of new consumers was 2,752.

With regard to the acquisition of the Winchester Gas Undertaking, a portion of the cost was charged to revenue account in 1936. The whole of the compensation paid to Directors and Officials and the remainder of the costs, totalling altogether £14,229, have been charged against profit and loss account, thus cutting down the capital expenditure.

In the revenue account, coal shows an increase of £9,816, which is covered by the increased revenue from residuals. The coal situation is most unsatisfactory and the new legislative proposals render it extremely doubtful whether equitable treatment will be accorded to coal consumers generally, and especially public utility undertakings, who are, undoubtedly, the most desirable customers of the coal owners in that they require a constant and regular supply of coal.

An award by the Joint Industrial Council gave an increase of 2s. per week to wage earners in the Gas Industry. This came into effect in September last, and it is estimated that the yearly cost to the Company will be approximately £4,200, this following a similar increase in the previous year. The Company were, however, fortunate in making coal contracts for the year 1938 at reasonable prices, and it is anticipated that unless something unforeseen occurs it will not be necessary to increase the price of gas this year.

An issue of capital was made in March last year. The new capital was primarily required to pay for a new retort plant which it was hoped to have started erecting some months ago. Owing, however, to the difficulty of obtaining materials, particularly steelwork, considerable delay has occurred. Good progress is now being made with the foundations and other work. Similar delays have occurred in the erection of the new purifiers, but I am happy to say they are now practically completed.

As I informed you last year, alterations have been made at the Victoria Rooms, the headquarters of the Company's Athletic and Social Club. A large room has been reconstructed and was handed over to the club in April last. This club room will bear comparison with any other social club in the town, and it has been very much appreciated by the club members.

Sir Russell moved the adoption of the report, Brigadier Jack, the Deputy-Chairman, seconded, and the resolution was carried unanimously.

Sir Russell Bencraft and Mr. Thomas Carmichael, the retiring Directors, and Messrs. Burnett, Swayne, and Stothert, the retiring Auditors were unanimously re-elected.

The Hornsey Gas Company

The Annual Ordinary General Meeting of the Proprietors of the Hornsey Gas Company was held at the Company's Offices, 5, Great Winchester Street, London, E.C., on Friday, Feb. 25, 1938—Mr. A. M. PADDON, M.Inst.C.E. (Chairman of the Company), presiding.

The GENERAL MANAGER AND SECRETARY (Mr. K. Leslie Mortimore, A.C.A.) read the notice convening the meeting.

THE CHAIRMAN'S ADDRESS.

The CHAIRMAN, moving the adoption of the Directors' Report and Statement of Accounts for the year ended Dec. 31, 1937 (which were taken as read), said it would be idle to pretend that the statement presented was entirely satisfactory, because a cursory examination of the figures showed that the amount of profit earned had decreased as compared with the previous year. The stark fact was that the carry-forward was nearly £6,000 less than it was for the previous year.

In view of that statement, the proprietors would naturally expect something by way of explanation and qualification of such an undesirable comparison. Well, the situation was susceptible of explanation. One of the main reasons for the decrease was that the cost of materials in every regard in which the Company was concerned had risen very materially during the period under review; the increases in the costs of those materials varied from 5 to 25%, according to the character of each commodity. It had been induced by and was in consonance with the general rise in the prices of such materials throughout the whole country, and a study of the reports of the various gas undertakings which had been published so far for 1937 showed that that fact had had to be recognized; it had had its recognition in a necessary, although undesirable, increase in the price of gas. That was more or less unavoidable. There had been increases of expenditure also on matters other than materials; for instance, in interest, rates, and taxes ancillary to the declaration of dividends the expenditure was nearly £1,500 greater. All those increases were beyond the control of the Company, and, going through the whole category of items of which the Revenue Account was made up, one found that the Company was pursued by that relentless increase in the costs of production and distribution of gas, which was common to all undertakings.

But there were certain matters of cost which qualified the situation favourably, for they were to the credit of the Company. The number of consumers supplied had become larger than ever before in the history of the Company. That meant, of course, a broadening of the Company's business; but, as was the case throughout the Gas Industry generally, it was associated with a decrease in the gas consumption *per capita*. A business which

was continually expanding and had increased the number of people with whom it transacted business could not be said to be decadent, and that record number of consumers was a distinctly reassuring feature in the Company's position. Since 1934 the provision of appliances by the Company for the use of gas had increased by nearly 100%; last year the value of the apparatus supplied by the Company to the public amounted to £70,000. Those figures indicated vitality and activity in the Company's business, and constituted a considerable set-off against any temporary financial set-back.

Another matter which, together with the other items of increased cost, made up the sum total of the excuse for increased expenditure, was the increase in the remuneration to labour, and that again was completely beyond the control of the Company. The increased cost in that direction was a material one.

The Accounts.

Commenting upon the Report and Accounts, the Chairman said there was a slight decrease of 1·2% in the sale of gas in 1937 as compared with 1936; but, bearing in mind that there was one day less in 1937 than in 1936 (1936 being a leap year), the decrease became a fraction of 1%.

The statements of capital stock and loan capital showed that the Company had all the capital powers it required for future issue. The capital account showed that the Company had spent during the year nearly £39,000 for capital purposes, at a time when it would least desire to do so; but by deducting depreciation, through the Revenue Account, it was reduced by £15,000 to £24,000, and that latter figure was represented largely by the showroom. The expenditure on the showroom might appear to be extravagant in the *prima facie* aspect; but it must be remembered that the Hornsey Company was dealing with a class of consumer to whom the appeal of an effectively presented showroom was of great importance. Although the expense had been great, the results had been gratifying.

But after all the capital expense incurred was recorded, the figures showed that the total capital expenditure per million cu.ft. of gas sold amounted to only £523, and there were not many gas companies with efficient works and properly provided distribution systems and such publicity as he had mentioned which could show anything like so low a figure. Of course, it was not the final arbiter in the affairs of a gas company, because a company which could show a low capital expenditure per million cu.ft. of gas sold might have defective works, poor storage, and no showrooms; but the Hornsey Company, although its capital expenditure was low, had made ample provision in all the respects mentioned. Therefore, it could congratulate itself upon having so low a capital figure on which to provide interest and dividends.

Coming to the Revenue Account, he said the epitome of the whole matter was that while the Company had received more money in 1937 in respect of the sale of gas and residuals than in 1936, so that the gross receipts had increased, there was in the ultimate result the disparity to which he had previously called attention, occasioned entirely by the causes which he had mentioned. Costs had increased by £4,000 in the Revenue Account, and there had been further increases shown in the Profit and Loss Account, making the major sum of £6,000 already mentioned. That problem, of course, had engaged the close attention of the Directors, and they would continue to devote very careful scrutiny to it. Hard times always induced economy in individuals or in companies, and it was hoped to effect considerable improvements in the conduct of the undertaking. They could not be very considerable, but every economy that could be made would be made.

Most Economical Undertaking in London.

All that had been said led up to the fact that the Company found itself compelled, in common with neighbouring undertakings and with undertakings all over the country, to increase the price of gas. The Board had increased the price from 8d. to 8·6d. per therm; that was an increase of only 7½%, which was very modest in comparison with the percentage increase in the prices of general commodities throughout the country. But the factor which really qualified it was that hitherto the price charged for gas by the Hornsey Company had been the lowest in the whole Metropolitan area, notwithstanding the disparity in its size as compared with other Metropolitan undertakings and the disadvantages in which it was placed in obtaining materials and in the general conduct of the business. The fact that the Company's price was the lowest throughout the whole Metropolitan area lay behind the decrease of profits which presented itself in the Accounts. Even when the price was raised to 8·6d. per therm, the Company was still selling at the lowest level at which gas was sold in the Metropolitan area; it was under-selling its not insignificant neighbour, the Gas Light and Coke Company, and other large companies which did not seem to benefit by their size. The Hornsey Company had a comparatively small undertaking, its area was surrounded on all sides, it was unable to obtain sea-borne coal, and yet for many years it had sold gas at the lowest price in the Metropolis. It was a reassuring feature that the Company's difficulties had not taken it out of the category of the most economical undertaking in London.

The Company had experienced a reduction of profits on the sale of gas, but it had gained on the sale of residual products, and that gain might continue. But it would be realized that there were considerable difficulties ahead. The Company had secured coal contracts as far ahead as it possibly could, but the attitude of the coal vendors towards industry generally was not very continent. Only two years ago there was an appeal, *ad misericordiam*, that the Gas Industry should pay voluntarily an increased price for coal, and that was conceded on condition that the extra money went to remunerate labour in the coal industry. But since then the tables had turned a little, and the coal producer was in the ascendant, and he would not be content with so modest an increase as 1s. per ton. So that the Gas Industry, having been chastised in the past with whips, would be chastised in the future with scorpions, and there was no doubt that the Hornsey Company, in common with other gas undertakings, must face a very large increase in the cost of coal, which increase could not be set off altogether against the increased receipts from residuals produced. The coal market fluctuated and those concerned with it passed in and out of it, generally with very large sums stated in their obituary notices! But the gas companies were not like that; they were performing a public service *sine die*, and could not extract from the public incontinent charges such as they themselves had to incur when buying coal; in other words, the price of coke could not be made to respond adequately to increases in the price of coal. So far as such undesirable prospects could be judged, the Company admitted them by an increase in the price of gas and by its renewed efforts to conduct its undertaking with the utmost efficiency.

Substantial Carry-Forward.

The Profit and Loss Account showed that the carry-forward had been reduced to just under £16,000. Many gas companies might say that they wished they had half as much, because they had either no carry-forward at all or very little. The Hornsey Company had still a very substantial carry-forward, and although its Reserve Fund was not of the dimensions which the Directors would wish to see—because perhaps a little more had been distributed in dividends than should have been distributed—it was invested outside the Company; it was available at a minute's notice, and it was worth more than the figure shown in the accounts. Again, the Special Purposes Fund, which replaced the old Insurance Fund, was invested to a material extent outside the Company. In spite of the difficult circumstances, the Company had made a contribution of £1,000 to the Renewal Fund in 1937, and that Fund provided a floating balance to assist the Revenue Account in connexion with any extra expenses which might have to be incurred. Taking all the factors into consideration, he did not think the position was so very unsatisfactory. He had mentioned the worst aspect first, because he considered it best to acknowledge debts before dealing with the credits.

With regard to the Balance-Sheet, it was comforting to note that the Company's investments, which were entered at £28,755, had a market value of £37,646, which latter sum could be obtained if those investments were sold at the moment. That money was independent of the Company's struggles or difficulties and was always available.

Co-partnership was in a healthy condition, and the benefits received from it by the Company were quite commensurate with the amount that had been spent on it.

Finally, the Chairman said that the Company had surmounted certain difficulties and it had even greater difficulties before it, but it was not without provision to meet them; he had a reasonable expectancy that he and his co-Directors would be able to face the proprietors twelve months hence with nothing very discreditable to their past record.

Mr. G. W. CAREY (Deputy-Chairman) seconded the resolution for the adoption of the Report and Accounts.

(There was no response to the Chairman's invitation to the proprietors to comment or to ask questions concerning the Report and Accounts, and the resolution was carried unanimously.)

Dividends.

On the motion of the CHAIRMAN, seconded by Mr. CAREY, the meeting resolved that dividends be declared for the half-year ended Dec. 31, 1937, being the final dividends for the year, on the 5% preference stock, 5% per annum, on the 5% stock, 7½% per annum, and on the 3½% stock, 6% per annum, all less income-tax, making, with the interim dividends already paid on

the 5% and 3½% stocks, 7½% and 6% respectively for the year; and that such final dividends be paid on Tuesday, March 1.

The CHAIRMAN commented that the Company would not be able to maintain those dividends, by reason of the increased price of gas, but he did not think the reduction would be very heavy, and it would be allowed that in all the circumstances it was thoroughly justified.

Re-Election of Retiring Directors.

The CHAIRMAN, proposing the re-election of Mr. E. L. Burton, F.S.A.A., and Mr. J. W. Buckley, M.Inst.C.E., who had retired by rotation, said that he did so with the greatest pleasure. All he had said in presenting the Report and Accounts was in effect a recommendation to the proprietors to re-appoint those who were best capable of dealing with the difficulties he had adumbrated. Over a long period of years Mr. Burton had acquired a conversancy with gas accounts and with the policy and administration of gas undertakings, and he had acquired a great facility for dealing with them. He was very familiar with the whole gamut of things which constituted gas administration, and the proprietors would be wise indeed to secure his services whilst they could. Mr. Buckley was an Engineer of great parts, and whatever was to be said in praise of the Hornsey Company was due mainly to his skill and his long service to it.

The resolution was seconded by Mr. F. H. JONES, M.Inst.C.E., and carried unanimously.

Mr. BURTON briefly responded.

Mr. BUCKLEY, in the course of his response, mentioned the success of co-partnership in the Hornsey Company, inaugurated about 14 years ago. It had been his privilege, he said, to preside at all the co-partnership Committee Meetings, with one or two exceptions. Men who had retired from the Company's service had received a considerable sum of money, in some cases no less than £263; on several occasions the men had said that they had not handled so much money in their lives before. The accumulated sum standing to the credit of the Sick and Benefit Fund was £4,300, of which £4,000 was invested. From his long association with the Committee he was positive that if relationships such as those existing between that Committee and the Company existed throughout the country, there would be very few disputes and very few strikes.

Re-Election of Auditor.

On the motion of Mr. K. R. MACKAY, seconded by Mr. E. A. PIERCE, the meeting unanimously re-elected Mr. H. A. Floate an Auditor of the Company.

Votes of Thanks.

The CHAIRMAN moved a hearty vote of thanks to the General Manager and Secretary, the Engineer, and other officers and the staff of the Company. The motion, he said, would take the form of encouragement, of stimulation, and of anticipation; he would prefer to look forward, as the officers and staff would desire, rather than look backwards. Their efforts in the past were appreciated, and after the somewhat dismal statement he had had to make they would realize how much the Company looked to them; they would realize that when matters presented a threatening aspect, their talents, assiduity, and industry should shine out brighter than ever, and he was perfectly confident that they would. Therefore, he moved the vote of thanks to the officers, staff, and all the workmen, coupled with the almost fervent anticipation of the enjoyment of their services in an advanced degree in the future.

The resolution was seconded by Mr. F. H. JONES and carried with acclamation.

Both Mr. K. LESLIE MORTIMORE (General Manager and Secretary) and Mr. C. C. V. GANDON (Engineer and District Superintendent) responded and assured the meeting that the vote of thanks would be very much appreciated.

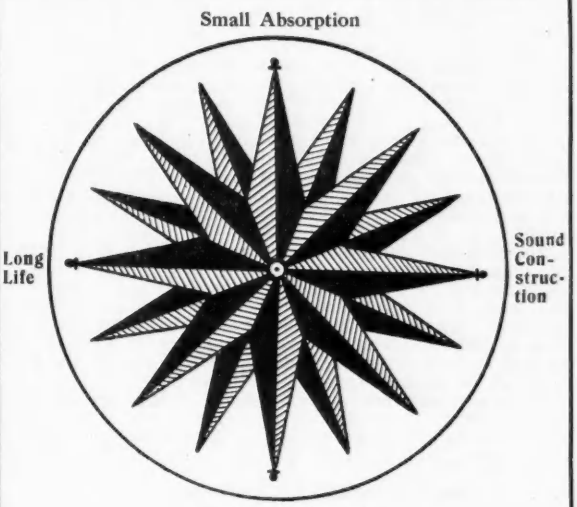
Mr. E. A. PIERCE proposed, and Mr. K. R. MACKAY seconded, a resolution of very sincere thanks to the Chairman and his Co-Directors for all they had done on behalf of the proprietors during the past year.

(The resolution was carried unanimously.)

The CHAIRMAN, expressing his appreciation, said that the Directors could not always present the picture they would desire to present; they were the victims of circumstances, as were other people. But they did appreciate the confidence of the proprietors, the expression of which would serve to stimulate their efforts to present in the future a brighter picture than they had been able to present on this occasion.

The Meeting then closed.

All the Cardinal Points



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ATHLETIC AND SOCIAL

South Suburban Children's Party.

About one hundred children with their parents were entertained by the South Suburban Gas Company Social Club to a tea-party, community singing, and pantomime, at the Cray Gas-Works, on Saturday afternoon, Feb. 12.

Among the guests were Mr. A. Ross (Employee Director of the Company), Mr. H. Weatherley (Employee Director), Mr. Wilfrid Wastell (late General Manager of the Company), Mr. J. Rudling (Cray Works Superintendent and Chairman of the Social Club), Mr. H. F. Glass (Local Manager), Mr. S. Hooker (Co-partnership Secretary), Mr. S. Hollman (Chairman of the Company's Sports Guild), Mr. William Gosling, and others.

With the help of Mr. Rudling, Mr. Henham, and Mr. Sweatman everything for the comfort of the guests was provided, and during the interval prizes were distributed to the Cray Works Social Club bowlers.

Mr. Sweatman announced that the successful bowlers included N. Booker; the runner-up was W. J. Brigden, winner of the championship three times in four years. The pairs competition was won by W. C. Sweatman and H. Gilham, the runners-up being W. J. Wood and H. J. Packman. Two more prizes were won by the Cray Works Social Club by Mr. Brigden and Mr. George Waller in the pairs competition for all clubs in the Sports Guild of the South Suburban Gas Company.

When the bowls players had received their prizes, the ladies handed gifts to all the children, and the party concluded with a variety entertainment by members of the pantomime company.

Cambridge Recreation Club Social.

A record number of members and their ladies attended the third social and dance arranged by the Indoor Games Committee of the Cambridge University and Town Gas Light Company's Recreation Club. Throughout the evening a varied programme provided entertainment for a wide range of tastes, and included dances old and new, games and competitions, and the rendering of a topical version of "Cock Robin" by the Thermonic Quartette. During the evening the Engineer and Manager, Mr. J. Hunter Rioch, shared the general enjoyment, with Mrs. Rioch, and was among those who generously donated prizes for the various competitions.

Canterbury Sports Club Dinner.

The annual dinner of the Canterbury Gas and Water Company's Sports and Social Club was attended by nearly 90 members, under the chairmanship of Mr. R. Vevers Scott.

Among those present were Mr. W. Laird (Chairman), Mr. R. C. Lancefield (Secretary), Mr. W. H. Ovenden (Hon. Treasurer), Dr. Harold Wacher, Mr. B. D. Stanley, Mr. H. M. Enderby (City Surveyor), Mr. G. T. Hall (Chief Constable), Mr. S. W. Bligh, Mr. D. J. Branson (Engineer to the Faversham Gas Company), Mr. H. S. S. Amos, and Mr. E. Gore (Corporation Roads Superintendent).

Cardiff Athletic and Social Club.

The seventeenth annual general meeting of the Cardiff Gas Light and Coke Company's Athletic and Social Club was held on Feb. 12 at the Carlton Restaurant, Queen Street. The meeting was followed by a dinner, which was supported by an excellent programme of musical items.

The report of the Council for the year ended Dec. 31, 1937, states that all sections of the Club have continued active as last year—viz., Association Football, Cricket, Harriers, Lawn Tennis, Bowls, Skittles, and Air Rifle. Additional sections added are Table Tennis, Junior Association Football, and Swimming. Distinctions of second place in the Welsh Championship on the track in the half-mile and one mile and second place in the Welsh Relay Championship, were secured by the Harriers' Section. Bowls, skittles, and cricket competitions maintained their popularity, and in addition a darts knock-out competition was arranged for the prize kindly presented by the Vice-President, Mr. R. J. Auckland. The H. D. Madden (Bowls) Challenge Cup was secured by Mr. J. Smith, Bute Terrace Works, for the second time. The Annual Sports were well supported and proved successful. Mr. D. J. Livingstone undertook the duties of Hon. Secretary in succession to Mr. A. W. Stickler, whose services during the past 14 years were gratefully acknowledged.

Once again Cyril Gallie, the Cardiff Gas Athletic Club feather-weight, demonstrated that he is in a class of his own when, at St. Patrick's Hall, Grangetown, Cardiff, recently, he defeated C. Webb, a member of the Columbia Boxing Club, London, the referee stopping the fight in the fourth and last round. Another member of the Cardiff Company, Jack Pottinger, added another to his list of triumphs in outpointing a clever boxer from Brighton, W. Hazel Grove, also over four rounds. Indeed, every contest was won by members of the Cardiff Gas Club.

These two contests stood out in importance on a programme that kept a packed audience interested for several hours.

The show was sponsored by the Cardiff Gas Athletic Club, and the proceeds went to the Cardiff South Ward Care Committee.

Gloucester Annual Dinner.

A gathering of about 230, including guests from Cheltenham and Stroud, was present at the first annual dinner given by the Directors of the Gloucester Gas Light Company to the staff and employees at the Connaught Rooms.

It was stated during the evening that the sales of the Company last year were over 611 million cu.ft. of gas, which was a further record in the history of the Company.

The chair was occupied by Mr. H. Leslie Boyce, M.P., a Director of the Company, who was supported by Mr. J. H. Jones, Mr. J. Morgan Matthews, and Mr. S. G. Wood (Directors).

Proposing "The Gloucester Gas Light Company," Mr. A. L. Morris (Commercial Manager) apologized for the absence of Major Julian Day, Chairman of the Company, who, he regretted to say, had been seriously ill, having undergone two operations. He was pleased to state, however, that Major Day was now making a good recovery.

Responding, Mr. Boyce also referred to the illness of Major Day, and stated that though he was making steady progress it would probably be some time before he was able to resume his duties as Chairman. He suggested that a message should be sent to Major Day from the gathering expressing regret at the cause of his absence, and wishing him a speedy recovery to good health. This suggestion was greeted with applause.

Mr. J. H. Jones, who is a past Chairman of the Company, submitted the toast of "The Visitors." He mentioned, amidst applause, that he had been connected with the Company for over 50 years, and in speaking of the changes that had taken place in that time, pointed out the advantages derived through the merging of the Gloucester, Cheltenham, and Stroud Undertakings in the Severn Valley Gas Corporation. He extended a very hearty welcome to the visitors, particularly from Stroud and Cheltenham.

Mr. T. H. Woodcock, Engineer to the Stroud Gas Light and Coke Company, acknowledged the toast, remarking that he thought such gatherings promoted a spirit of comradeship that was valuable to everybody concerned.

An excellent musical programme was rendered by Messrs. Frank James (comedian), Phil Smith (comedian and dancer), "Bofey" (signature cartoons and magic), Cecil Bode (entertainer and character studies), and Val Wallace (at the piano).

Narborough and Whetstone Staff Dinner.

A large gathering attended the first annual staff dinner of the Narborough and Whetstone Gas, Light, and Coke Company, which was held at the Bull's Head Hotel, Whetstone, on Feb. 3.

Portsmouth Long Service Awards.

Long service with Portsmouth and Gosport Gas Company was rewarded on Feb. 21, when presentations were made to 11 employees who were retiring, two who had completed 40 years' service and 13 who had completed 25 years' service. The presentations were made by the Chairman of the Company (Alderman F. E. Beddow, D.Sc., J.P.) at a concert at the Oddfellows' Hall.

Mr. R. W. Hewitt, Secretary of the Company, presided in the absence of Mr. T. Carmichael, and Mr. E. Allison (Engineer) read the records of the men who were retiring. It was explained that the employees and the Company subscribed equally to the presentations. Those present included Mr. F. Kilpatrick, one of the Directors.

A concert was given by the Harmony Trio, Miss Sheppard (soloist), Mr. Jock Sanderson (xylophone), Mr. Frank Byron (soloist), Mr. Fred Reed (comedian), the Four Equilibrists, Len Fryer's Harmonica Arcadians, with Mr. Clifford Mills at the piano.

"Victor" Sports Club Dinner.

The "Victor" Sports Club, which is the sports organization of Thomas Potterton (Heating Engineers), Ltd., held their Seventh Annual Dinner, Concert, and Dance at Stanley Hall, Clapham, S.W. 11, on Saturday, Feb. 26, when 150 members and guests were present. The Toast of "The Club" was proposed by the President (Mr. T. F. C. Potterton) and acknowledged by Mr. F. Brooks. "The Ladies, Visitors, and Press" was proposed by Mr. T. G. Brooks and responded to by Mr. T. W. Moore. An enjoyable programme of dancing and other entertainments concluded the evening.

TRADE NOTES

A Change of Address.

As from Feb. 28 the address of Messrs. Stewarts & Lloyds' Publications Department will be 145, Queen Victoria Street, London, E.C. 4. (Telephone: CENtral 3418.)

Air Conditioning.

An associate Company of Pegson, Ltd.—Mellor, Bromley, & Co., Ltd.—several years ago commenced a department for dealing with air conditioning, which has now developed until they are supplying equipment to practically every type of industry.

An interesting brochure has been published by the firm, illustrating the various systems which the firm supply, including plants for factories, cinemas, hospitals, hotels and restaurants, flats, offices, and stores.

Air Raid Precautions.

The A.F.I Type "Alcosa" filter and ventilator for gas-proof rooms will supply sufficient filtered air for up to eight persons. It is simply operated; when the lever is depressed by foot at the rate of 30 strokes per minute the quantity of air delivered is 1,200 cu.ft. per hour. The filter builds up a slight pressure in the room, thus overcoming any slight defects in the efficient sealing of the room. The filter medium of the "Alcosa," which is solely manufactured by Messrs. William Allday & Co., Ltd., 38a, Paradise Street, Birmingham, 1, is based on the same principle as the service respirator and is very efficient and easily replaceable.

"Dual Cross" Accounting.

The New Remington No. 86 Dual Cross Accounting Machine, with completely electrified alphabet and figure keyboard, has many useful features, such as automatic spacing and tabulation, mechanical check on accuracy of cross computation and dual feed mechanism.

It is extremely flexible and can be applied to billing, cash posting, fitting and residuals accounts, receipt and cheque writing, purchases accounts, and, in fact, every kind of book-keeping work. We are informed that an increasing number of gas undertakings have taken advantage of the manifold uses of this machine by installing them in their offices, where they have been a marked success.

Safety Valves.

Leaflets issued by Hopkinsons, Ltd., of Huddersfield, refer to the firm's "Hylif" safety valve, which was introduced in 1929 to provide a suitable valve of maximum discharge capacity for the modern high-duty boiler. It is stated that the aggregate discharge capacities of Hopkinsons' "Hylif" safety valves actually installed or on order amount to 124 million lb. of steam per hour. These valves are stated to give satisfactory performance at working pressures of 600 lb. per sq.in. and above and at temperatures of 800° F. and above. Among the products of this firm are combined stop and check valves; balanced type reducing valves; parallel slide valves with electrical control, all of which are tested to very high pressures.

Directory of Telegraphic Addresses.

The fifty-third annual issue of Sell's Directory of Registered Telegraphic Addresses bears adequate testimony to the foresight and enterprise of the late Mr. Henry Sell, who many years ago realized the necessity for such a publication. Its growth has been phenomenal, ever since the Official lists were supplied to Mr. Sell by authority of H.M. Postmaster-General.

The information concerning some 100,000 firms in Great Britain and Ireland is so comprehensive that quite apart from its use for telegraphic purposes it can be regarded as a reliable commercial directory, giving access to postal addresses, telephone numbers, and trade descriptions of firms throughout the whole country. The Directory is obtainable from Messrs. Business Dictionaries, Ltd.

New Water Softening Plant for Chesterfield.

What is claimed to be a new type of water softening plant is being installed by the Chesterfield and Bolsover Water Board. Known as the Permutit Hydrogen Sodium Base Exchange water softening plant, it is stated to be the first of its kind to be installed in this country. Eight months ago the contractors laid down an experimental plant at Bolsover for the use of the Board. As this has proved satisfactory an order has been placed for a permanent installation.

The plant reduces the total hardness of water from 28° to 6°. It has a capacity of 1,000,000 gallons per day, and the water is ideal for household and industrial purposes. Running costs are low. The contractors are the Permutit Company, Ltd., Gunnersbury Avenue, London.

Le Bas Tube Company, Ltd.

Over 82 million cu.ft. of gas is supplied annually to the Britannia Iron Works by the Bedford District Gas Company for the manufacture of "GF" malleable iron pipe fittings by the Le Bas Tube Company, Ltd., whose head offices are at Dock House, Billiter Street, E.C. 3. This is one of the interesting facts contained in current folder literature recently issued by the firm. These folders are available to readers, who will find that they enlarge upon information contained in "GF" advertisements. For over sixty years "GF" fittings have given complete satisfaction to gas undertakings. They are attractive in appearance, combining the qualities of strength and non-porosity. They are annealed in gas-fired furnaces so that the threads take the contour of the pipes screwed into them, making a perfect metal-to-metal joint.

New Process for Removing Water Jacket Deposits.

It is not always realized that cracks in cylinder heads and exhaust manifolds are often due to extremely hard deposits in the water jackets, which, in time, bring about unequal cooling thus leading to fracture. These deposits, which are of a white and almost crystalline nature, are so tenacious that the chief mechanical means of removal is by the somewhat brutal use of a cold chisel; but obviously even this method can be used only to a limited extent and where there is accessibility.

A new process has been developed by Barimar, Ltd., whereby the most obstinate deposits in water spaces can be removed in a few hours without the slightest harm to cast iron or other metal parts. This greatly improves the efficiency of the engine. The methods employed have been used by Barimar for some time past, and the results have proved so successful that it was decided to make the process available even if no welding repair work is required on the part concerned. Components both large and small can be handled with equal facility.

Concrete Utilities, Ltd.

Concrete Utilities claim to be the pioneers in the design and manufacture of concrete lamp columns. Their many years' experience places them excellently in this industry. Engineers and lighting authorities quickly realized the advantages of concrete lighting columns and hundreds of corporations have erected thousands of the Concrete Utilities columns both at home and in all parts of the world. The manufacturers have, in consequence, a vast store of information governing the effect of climatic conditions, handling, transit, and erection. The success of their columns is due to the constant investigation regarding the use of the finest materials, careful calculation, and planning of reinforcement. Then, of course, must be considered the general finish, and the all importance of the impressiveness and appropriateness of design. Strength and maintenance must be taken into consideration when lighting schemes are under consideration. The latter point affects the ultimate cost.

Painting or colouring is quite unnecessary, for concrete columns always maintain their bright, clean appearance. Their strength is such that they are proof against severe shocks and will not snap off. Further, whatever atmospheres they may be subjected to, corrosion will not occur either externally or internally.

The Departmental Committee on Street Lighting issued in their final report certain recommendations relating to the heights of lamp columns, also overhangs governing both main traffic routes and side streets. This information along standard lines has been most helpful to engineers and those concerned in the planning of lighting schemes.

Concrete Utilities have organized their factory and plant to produce concrete lamp columns in accordance with the recommendations set forth in the Committee's Final Report.

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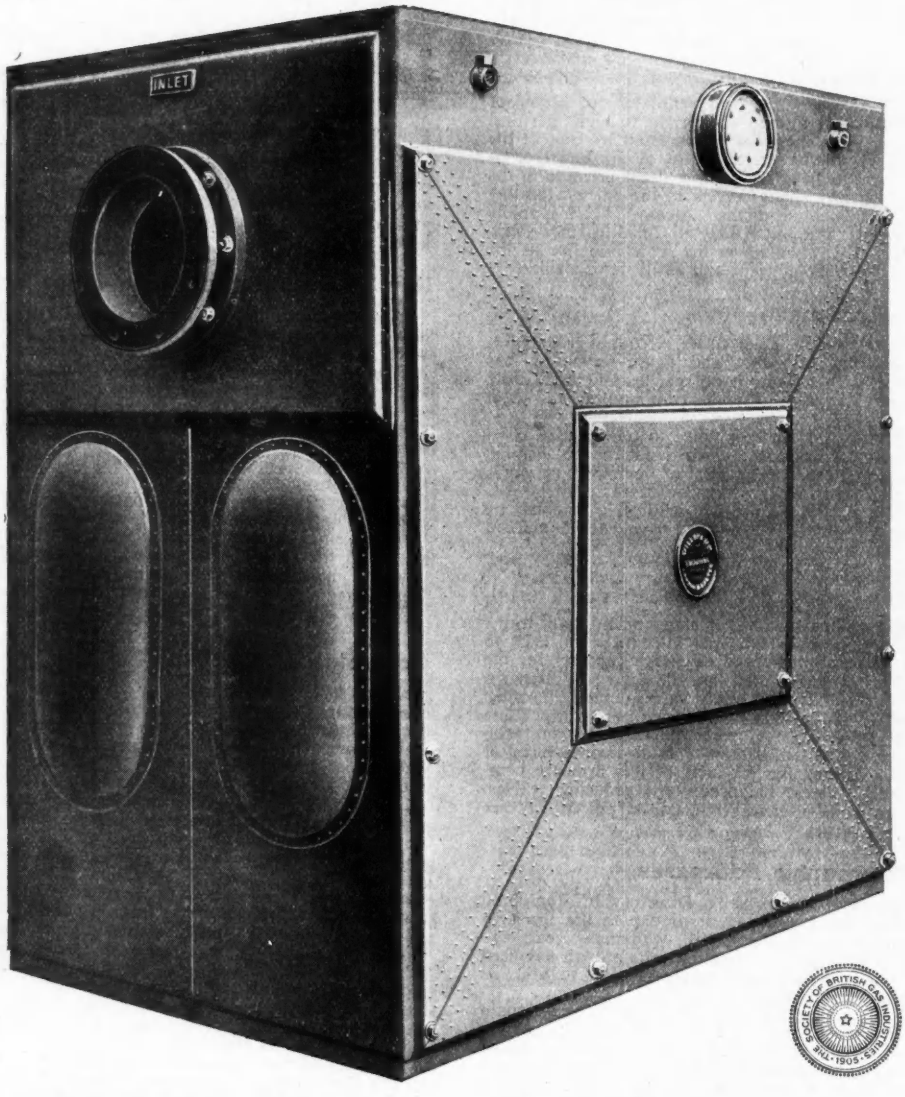

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Markets and Manufactures

Current Sales of Gas Products

The London Market

Feb. 28.

There are no changes to report in the prices of Tar products, which remain at about the following levels:

Pitch is nominal at 38s. per ton f.o.b.
Creosote, 5⅞d. to 6d.
Refined tar, 3¾d.
Pure toluole, 2s. 2d. to 2s. 3d.
Pure benzole, 1s. 8d.
95/160 solvent naphtha, 1s. 7d.
90/160 pyridine, 10s. to 11s.
All per gallon naked at makers' works.

The Provinces

Feb. 28.

Crude Gas-Works Tar, 22s. 9d. to 27s. 9d.

To avoid misunderstanding, it is necessary to state that the above price is not claimed to represent a market value. It is a price worked out from week to week upon a system which has been used for many years as a basis for the fixing of certain contracts for crude tar of varying qualities in different areas.

The average prices of gas-works products during the week were: Pitch—East Coast, 36s. 6d. to 37s. 6d. f.o.b. West Coast—Manchester, Liverpool, Clyde, 36s. 6d. to 37s. 6d.* Toluole, naked, North, 1s. 7½d. to 1s. 9d. Coal tar, crude naphtha, in bulk, North, 8d. to 8½d. Solvent naphtha, naked, North, 1s. 4½d. to 1s. 5d. Heavy naphtha, North, 1s. 3d. to 1s. 3½d. Creosote, *ex* works, in bulk, North, liquid and salty, 5d. to 5½d.; low gravity, 4⅞d. to 4½d. Heavy oils, in bulk, North, 5d. to 5¼d. Carbolic acid 60's, 3s. to 3s. 3d. Naphthalene, £13 10s. to £16. Salts, 80s. to 85s., bags included. Anthracene, "A" quality, 4½d. to 4¾d. per minimum 40% purely nominal; "B" quality unsalable.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls whatever they may be.

Scotland

GLASGOW, *Feb.* 26.

There is a little more business being placed, but prices remain rather unstable.

Crude gas-works tar.—Actual value is 37s. to 38s. per ton *ex* works in bulk.

Pitch is without interest at 28s. to 30s. per ton f.o.b for export, and round 28s. per ton *ex* works in bulk for home trade.

Refined tar.—Numerous schedules are being filled up with prices unchanged at 3½d. to 4d. per gallon for home trade and 3d. to 3⅛d. per gallon for export, both *ex* works in buyers' packages.

Creosote oil.—Owing to the volume of business recently concluded prices are a little firmer as under: Specification oil, 5d. to 5⅛d.; low gravity, 6⅛d. to 6⅜d.; neutral oil, 5d. to 5⅛d. per gallon, all *ex* works in bulk.

Cresylic acid remains dull and values today can be taken as follows: Pale, 97/99%, 2s. 7d. to 2s. 9d. per gallon; dark, 97/99%, 2s. 5d. to 2s. 7d.; and pale, 99/100%, 2s. 9d. to 3s. 3d. per gallon; according to quality, all *ex* works in buyers' packages.

Crude naphtha still commands 6d. to 6½d. per gallon *ex* works in bulk, according to quality and district.

Solvent naphtha.—90/160 is slightly easier at 1s. 5d. to 1s. 6d. per gallon, but 90/190 heavy naphtha is unchanged at 1s. 1d. to 1s. 2d. per gallon.

Motor benzole remains steady at 1s. 4½d. per gallon.

Pyridine.—Supplies are not plentiful, but values are unchanged at 12s. to 12s. 6d. per gallon for 90/160 grade, and 13s. to 14s. per gallon for 90/140 grade.

Benzole Prices

These are considered to be the market prices for benzole at the present time:

	s.	d.		s.	d.	
Crude benzole..	0	9	to	0	9½	per gall. at works
Motor " ..	1	2⅛	"	1	3	" " "
90% " ..	1	3⅛	"	1	4	" " "
Pure " ..	1	7½	"	1	8	" " "

Contracts Advertised To-Day

Coal.
Caernarvon Gas Department. [p. 682.]
Walsall Gas Department. [p. 682.]

Gas Oil.
Leeds Gas Department. [p. 682.]

Inspection of Gasholders.
Southport Gas Department. [p. 682.]

Meters.
Leeds Gas Department. [p. 682.]

Steel Main.
Leeds Gas Department. [p. 682.]

Stores.
Leeds Gas Department. [p. 682.]
Sowerby Bridge Gas Department. [p. 682.]

Tubes and Fittings.
Leeds Gas Department. [p. 682.]

Overseas Opportunities

Johannesburg

Spun Iron Pipes, Spigot and Socket, and Fittings.—A well-established firm of agents at Johannesburg wishes to obtain the representation of United Kingdom manufacturers of the above-mentioned goods for the Union of South Africa. (Ref. No. 112.)

Vertical Steam Boiler and Feed Pump.—H.M. Trade Commissioner at Johannesburg reports that the Union of South Africa Public Works Department is calling for tenders, to be presented in Pretoria by March 17, 1938, for the supply of one vertical cross tube steam boiler and one weir feed pump for a hospital laundry. (Ref. T.Y. 17609/38.)

Dividend Announcement

A dividend of 4⅜% on the Original Shares and 3½% on the New Shares of the Altrincham Gas Company was paid on Feb. 22, making, with the interim dividend paid in August, 1937, 9¼% and 7%, respectively, for the year ended Dec. 31, 1937.

Gas Debenture Placing

Application is about to be made to the Stock Exchange for permission to deal in £125,000 3¾% debenture stock of the Portsmouth and Gosport Gas Company. The stock, which is redeemable at par on Jan. 1, 1963, has recently been sold through a firm of stockbrokers at 101%, less ½% commission. The Company has an issued share capital of £1,032,961 and a loan capital of £510,906 (including the new 3¾% debenture stock).

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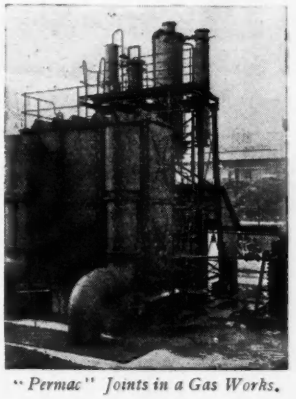

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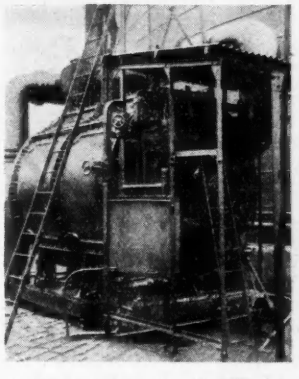

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Ever since 1913 "PERMAC," the original Metal-to-Metal Jointing, has been holding up difficult joints like these in important Gas Works and on Coke Oven Plants all over the world. Equally suitable for any joint—steam, water, gas, oil—screw pipe or flange.

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Glover-West verticals for long service

AT NEWCASTLE-UPON-TYNE

The two Glover-West vertical retort houses at the Elswick works of heNewcastle-upon-Tyne and Gateshead Gas Company were completed in 1913 and 1915. Two retort benches in No. 1 house were reconstructed in 1931 and 1932. The recent reconstruction of a bench in No. 2 house constitutes the fifth order for Glover-West verticals placed by the Newcastle Gas Undertaking.

Glover-West

VERTICAL RETORTS

418 plants built or ordered in 24 countries

The capacity for long and efficient service remains an important feature in the Glover-West plant of modern design. In many parts of the world our installations continue to give excellent results after extended periods of continuous operation.

WEST'S GAS IMPROVEMENT CO. LTD.,

MANCHESTER: Albion Ironworks, Miles Platting LONDON: Columbia House, Aldwych, W.C.2

GAS STOCKS AND SHARES

The political disturbances abroad have been a bugbear to markets for a long time past, but coupled with these distractions last week was the flurry in the home political front. When it became clear, however, after Monday's proceedings in the House of Commons that the domestic issue here need cause no alarm, and in the absence of anything very sensational in Herr Hitler's speech, buyers began to appear in almost every section. Supplies were quite inadequate to meet the demand and prices made substantial recovery. Conditions quietened down towards the end of the week, though quotations in many sections held most of their previous gains. It is evident that a more confident tone exists and with the slightest sign of improvement in foreign affairs markets should become busy.

The Gas market recorded a steady volume of business and prices on the whole closed firm. Most of the ordinaries are now *ex div.*, and apart from these markings the majority of the changes in the Official List last week were upwards, though a fall of 2 points occurred in Tottenham ordinary. In the Supplementary List a feature was the sharp rise of 9 in Weymouth ordinary to 112½, business being recorded at 110.

Reports and accounts continue to come in and it is pleasing to note that practically all companies show increases in sales of gas—in some cases very substantial increases—while dividends have been either maintained or fractionally improved.

At the time of writing there is a good list of ordinaries available, as shown below, giving yields of 5% or over, and among these particular attention is again drawn to Imperial Continental which now stands at an exceptionally low price:

Amount Offered.	——	Dividend, %	Price.	Yield, %
£				£ s. d.
4,200	Associated Gas and Water £1 ..	5	20/–	5 0 0
2,500	Bombay £1	8	27/6	5 17 0
580	Brighton, Hove, and Worthing 6% ..	7½	150	5 0 0
868	Colombo £1	10	35/6	5 12 8
1,000	Commercial	5	88	5 13 6
5,000	Imperial Continental	10	125	8 0 0
2,000	South Metropolitan	5½	108	5 1 10
5,000	South Western Gas and Water Corporation £1	5	19/6	5 2 6
2,610	Swansea	5	100	5 0 0
5,000	United Kingdom Gas Corporation £1	5	20/–	5 0 0

Official Quotations on the London Stock Exchange

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Feb. 25.	Rise or Fall on Week.
1,767,439	Sept. 6	8	8	Alliance & Dublin Ord. ...	157—162	...
374,000	Dec. 13	4	4	Do. 4 p.c. Deb. ...	95—100	...
558,190	Nov. 15	5	5	Asscd. Gas & Water U'd'ts Ord.	18/6—20/6	...
500,000	,,	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	19/—21/–	...
216,041	,,	—	§–/4	Do. 4 p.c. Red. Cum. Pref.	19/—20/–	...
278,590	,,	§–/2⅝	4	Do. 4 p.c. Irred. Cum. Pref.	17/—19/–	...
500,000	Sept. 6	§35/–	3½	Do. 3½ p.c. Red. Deb. ...	95—100	...
558,890	Aug. 9	7	7	Barnet Ord. 7 p.c.	158—163	...
300,000	Oct. 4	1/9⅜	1/4½	Bombay, Ltd.	26/—28/–	...
179,915	Feb. 21	9½	9½	Bournemouth sliding scale ...	197—202*	—3
590,407	,,	7	7	Do. 7 p.c. max. ...	156—161*	—2
493,960	,,	6	6	Do. 6 p.c. Pref. ...	131—136*	—2
50,000	Dec. 13	3	3	Do. 3 p.c. Deb. ...	78—83	...
262,025	,,	4	4	Do. 4 p.c. Deb. ...	98—103	...
335,000	,,	5	5	Do. 5 p.c. Deb. ...	115—120	...
357,900	Feb. 21	7½	7½	Brighton, &c., 6 p.c. Con. ...	147—152*	—3
649,955	,,	6⅜	6⅜	Do. 5 p.c. Con. ...	131—136*	—2
205,500	,,	6	6	Do. 6 p.c. 'B' Pref.	125—130*	—2½
855,000	Sept. 20	8	7	British Ord.	140—145	...
100,000	Dec. 13	7	7	Do. 7 p.c. Pref.	140—145	...
350,000	,,	5½	5½	Do. 5½ p.c. 'B' Cum. Pref.	110—115	...
120,000	,,	4	4	Do. 4 p.c. Red. Deb. ...	95—100	...
450,000	,,	5	5	Do. 5 p.c. Red. Deb. ...	102—107	...
450,000	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	95—100	...
100,000	22 May'33	6	4	Cape Town, Ltd.	1½—2½	...
100,000	6 Nov.'33	4½	4½	Do. 4½ p.c. Pref. ...	1⅞—3½	...
150,000	Dec. 13	4½	4½	Do. 4½ p.c. Deb. ...	70—75	...
626,860	Feb. 7	6	6	Cardiff Con. Ord.	120—125	—3
237,860	Dec. 13	5	5	Do. 5 p.c. Red. Deb.	106—111	...
98,936	Oct. 4	2/–	2/–	Colombo Ord....	1⅝—1⅞	...
24,510	,,	1/4½	1/4½	Do. 7 p.c. Pref.	23/6—25/6	...
739,453	Oct. 4	–/11·48	–/11·48	Colonial Gas Assn. Ltd. Ord.	17/—19/–	...
296,144	,,	1/3·30	1/3·30	Do. 8 p.c. Pref.	22/—24/–	...
1,775,005	Feb. 7	5	5	Commercial Ord.	83—88	...
620,000	Nov. 29	3	3	Do. 3 p.c. Deb. ...	73—78	...
286,344	Feb. 7	5	5	Do. 5 p.c. Deb. ...	113—118	...
807,560	Feb. 21	7	7	Croydon sliding scale... ...	138—143*	—2
644,590	,,	5	5	Do max. div.	107—112*	—2
620,385	Dec. 13	5	5	Do. 5 p.c. Deb.	115—120	...
239,000	Feb. 7	5	5	East Hull Ord. 5 p.c.... ...	96—101	...
185,355	Feb. 21	6	6	East Surrey Ord. 5 p.c. ...	118—123*	—2
176,211	Dec. 13	5	5	Do. 5 p.c. Deb. ...	112—117	...
250,000	Nov. 15	7	4	Gas Consolidation Ord. ...	19/6—21/6	...
250,000	,,	4	4	Do. 4 p.c. Red. Cum. Pref.	18/6—20/6	...
19,223,324	Feb. 7	5⅜	5⅜	Gas Light & Coke Ord. ...	23/3–24/3a	...
2,600,000	,,	3½	3½	Do. 3½ p.c. max. ...	83—86	...
4,477,106	,,	4	4	Do. 4 p.c. Con. Pref.	100—103	+1
2,993,000	Jan. 17	...	3¾	Do. 3¾ p.c. Red. Pref.	101½—103½	+½
8,602,497	Nov. 29	3	3	Do. 3 p.c. Con. Deb.	81—84	...
3,642,770	,,	5	5	Do. 5 p.c. Red. Deb.	113—116	...
3,500,000	,,	4½	4½	Do. 4½ p.c. Red. Deb.	111½—114½	...
700,000	Sept. 6	3½	3½	Do. 3½ p.c. Red. Deb.	98—101	...
270,466	Feb. 21	6	6	Harrogate New Cons. ...	118—123*	+3
157,500	April 5	1/2⅜	1/2⅜	Hong Kong and China Ord	⅜—1	...
213,200	Feb. 7	6	6	Hornsey Con. 3½ p.c. ...	116—121	...
5,600,000	Nov. 1	12	8	Imperial Continental Cap. ...	122—127	—3
223,130	Jan. 17	3½	3½	Do. 3½ p.c. Red. Deb. ...	88—93	...
285,242	Feb. 21	8½	8½	Lea Bridge 5 p.c. Ord. ...	167—172*	—3
11,751	Feb. 21	8	10	Maidstone 5 p.c. Cap.... ...	175—185*	—5
63,480	Dec. 13	3	3	Do. 3 p.c. Deb. ...	70—75	...
75,000	Nov. 29	†10	†10	Malta & Mediterranean ...	145—155	...
				Metropolitan (of Melbourne)		...
392,000	Oct. 1	5½	5½	5½ p.c. Red. Deb.	100—103	...

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Feb. 25.	Rise or Fall on Week.
231,977	Feb. 21	5	5	M.S. Utility 'C' Cons. ...	99—104*	—2
968,658	,,	4	4	Do. 4 p.c. Cons. Pref.	95—100*	—1
360,075	Dec. 13	4	4	M.S. Utility 4 p.c. Deb. ...	97—102	...
148,955	,,	5	5	Do. 5 p.c. Deb. ...	113—118	...
675,000	Nov. 15	†9	†6	Montevideo, Ltd.	75—80	—3
250,000	Aug. 9	7½	7½	North Middlesex 6 p.c. Con.	147—152	...
396,160	Feb. 7	5	5	Northampton 5 p.c. max. ...	108—113	...
300,000	Oct. 18	†7	†9	Oriental, Ltd.	153—158	...
468,537	Dec. 13	8	8	Plymouth & Stonehouse 5 p.c.	154—159	...
621,667	Feb. 7	8¼	8¼	Portsmouth & Gosport Cons.	161—166	...
241,446	,,	5	5	Do. 5 p.c. max. ...	102—107	...
73,350	,,	5	5	Do. 5 p.c. Pref. ...	108—113	...
247,966	Dec. 13	4	4	Primitiva 4 p.c. Cons. Deb. ...	98—103	...
625,959	Jan. 17	4	4	Do. 4 p.c. Red. Deb. ...	95—100	...
15,000	Sept. 6	6	6	San Paulo 6 p.c. Cum. Pref. ...	9—9½	...
441,275	Sept. 20	1/1½	1/1½	Severn Val. Gas Cor. Ld. Ord.	21/6—23/6	...
460,810	,,	–/10⅛	–/10⅛	,, ,, 4½ p.c. Cum. Pref.	19/6—21/6	...
133,201	Feb. 7	8½	5	Shrewsbury 5 p.c. Ord. ...	128—133	...
9,000	June 7	4	4	South African Ord.	3¼—4⅛	...
1,371,752	Sept. 6	1/2⅛	1/2⅛	South East'n Gas Cn. Ld. Ord.	23/—25/–	...
871,636	,,	–/10⅛	–/10⅛	Do. 4½ p.c. Red. Cum. Pref.	20/—22/–	...
498,818	,,	4	4	Do. 4 p.c. Cum. Pref. ...	18/—20/–	...
450,000	Feb. 7	4	4	Do. 4 p.c. Deb.	98—101	...
150,000	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	95—98*	...
6,709,895	Feb. 7	6	5	South Met. Ord.	106—109	...
1,135,812	,,	6	6	Do. 6 p.c. Irred. Pf. ...	130—135	+1
850,000	,,	4	4	Do. 4 p.c. Irred. Pf. ...	97—100	...
1,895,445	Dec. 13	3	3	Do. 3 p.c. Deb. ...	77—80	...
1,000,000	Jan. 17	5	5	Do. 5 p.c. Red. Deb....	109—112	...
1,543,795	Feb. 7	6	6	South Suburban Ord. 5 p.c. ...	118—123	...
512,825	,,	5	5	Do. 5 p.c. Pref....	110—115	...
500,000	,,	4	4	Do. 4 p.c. Pref....	95—100	...
250,000	,,	§18/9	3¾	Do. 3¾ p.c. Red. Pref.	98—101	...
888,587	Dec. 13	5	5	Do. 5 p.c. Deb....	115—120	...
250,000	,,	4	4	Do. 4 p.c. Deb....	97—100	...
200,000	Sept. 20	...	3½	Do. 3½ p.c. Red. Deb.	94—99	...
427,859	Nov. 1	1/2⅛	9⅛	S. Western Gas & Water Ord.	18/6—20/6	...
160,523	,,	–/10⅛	–/10⅛	Do. 4½ p.c. Red. Cum. Pf.	19/6—21/6	...
110,000	Dec. 13	4	4	Do. 4 p.c. Red. Deb. ...	97—102	...
750,541	Feb. 7	5	5½	Southampton Ord. 5 p.c. ...	109—114	...
148,836	Dec. 13	4	4	Do. 4 p.c. Deb.	96—101	...
350,000	Feb. 7	5½	5½	Swansea 5½ p.c. Red. Pref. ...	108—113	...
94,000	Jan. 3	3½	3½	Do. 3½ p.c. Red. Deb. ...	95—100	...
1,076,490	Feb. 7	6⅜	6⅜	Tottenham and District Ord.	128—133	—2
409,835	,,	5½	5½	Do. 5½ p.c. Pref....	119—124	...
62,235	,,	5	5	Do. 5 p.c. Pref....	108—113	...
371,850	Dec. 13	4	4	Do. 4 p.c. Deb....	97—102	...
85,701	July 19	‡6	6	Tuscan 6 p.c. Red. Deb. ...	96—101	...
888,629	Oct. 4	6	4	U. Kingdom Gas Cor. Ord....	19/—21/–	...
937,743	Nov. 15	4½	4½	Do. 4½ p.c. 1st Cum. Pref.	20/—22/–	...
500,000	,,	...	–/1·15	Do. 4 p.c. 1st Red. Cum. Pf.	19/—21/–	...
745,263	Dec. 13	4½	4½	Do. 4½ p.c. 2nd Non-Cum.Pf.	16/6—18/6	...
1,000,000	Sept. 20	3½	3½	Do. 3½ p.c. Red. Deb. ...	96—99	...
373,939	Feb. 7	7	7	Uxbridge, &c., 5 p.c.	136—141	...
133,010	,,	5	5	Do. 5 p.c. Pref. ...	108—113	...
1,371,138	Feb. 7	7	7	Wandsworth Consolidated ...	138—143	...
2,525,768	,,	4	4	Do. 4 p.c. Pref. ...	96—101	...
1,343,964	Dec. 13	5	5	Do. 5 p.c. Deb. ...	115—120	...
383,745	,,	4	4	Do. 4 p.c. Deb. ...	97—102	...
558,342	Feb. 7	7	7	Watford and St. Albans Ord.	138—143	...
200,000	,,	5	5	Do. 5 p.c. Pref. ...	108—113	...
200,000	,,	5½	5½	Do. 5½ p.c Pref. ...	119—124	...
200,000	Nov. 29	4	4	Do. 4 p.c. Red. Deb.	95—100	...
100,000	,,	3½	3½	Do. 3½ p.c. Red. Deb.	94—99	...

a.—The quotation is per £1 of stock. * Ex. div. † Paid free of income-tax ‡ For year. § Actual.

Supplementary List and Provincial Exchanges overleaf.

STOCK AND SHARE LIST—Cont.

Supplementary List, not Officially Quoted, London

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Feb. 25.	Rise or Fall on Week.
202,152	Sept. 6	25/-b	5	Ascot Ord.	105—110	...
128,182	Dec. 13	5	5	Do. 5 p.c. Pref.	108—113	...
31,035	Aug. 23	...	-/4½	Associated Utilities 4 p.c. Pref.	16/6—18/6	...
100,000	Dec. 13	...	3½	Do. 3½ p.c. Red. Deb....	95—100	...
17,000	Feb. 21	8	8	Bognor Orig. Ord. 'A' ...	157—167*	—3
62,210	,,	8	8	Do. New Addl. 'A' ...	157—167*	—3
87,160	,,	7	7	Do. New 7 p.c. max. ...	138—143*	—3
37,440	Feb. 7	10	10	Cam. Univ. & Town10 p.c. max.	190—200	...
125,970	,,	7	7	Do. 7 p.c. max.	135—140	...
39,025	,,	5	5	Do. 5 p.c. max.	97—102	...
96,410	Feb. 7	4½	4½	Cardiff 4½ p.c. Pref.	95—100	...
150,000	Feb. 21	4	4	Croydon 4 p.c. Pref.	97—101*	...
130,000	Dec. 13	4	4	Do. 4 p.c. Deb.	97—102	...
65,000	Aug. 9	8½	7½	Eastbourne 'A' 5 p.c. ...	158—163	...
198,000	,,	7	6	Do. 'B' 3½ p.c.	128—133	...
112,312	,,	5	5	Do. 5 p.c. Pref.	108—113	...
130,000	Dec. 13	5	5	Do. 5 p.c. Deb.	113—118	...
24,000	Feb. 21	8½	8½	Great Yarmouth 8½ p.c. max.	43—48*	—1
59,400	,,	7½	7½	Do. 7½ p.c. max.	33—38*	—1
51,160	Dec. 13	5½	5½	Do. 5½ p.c. Deb.	120—125	...
152,600	Feb. 21	8	9	Guildford Cons.	167—172*	—3
54,055	,,	5	5	Do. 5 p.c. Pref.	108—113*	—2
68,250	Dec. 13	5	5	Do. 5 p.c. Deb.	112—117	...
156,600	Feb. 21	7½	7½	Hampton Court Cons. ...	142—152*	—3
80,000	Feb. 21	4	4	Lea Bridge 4 p.c. Pref ...	94—99*	—1
60,000	,,	6	6	Do. 6 p.c. Pref. ...	123—128*	—2
94,876	Dec. 13	4	4	Do. 4 p.c. Deb. ...	97—100	...
73,620	Sept. 6	8¾	8¾	Luton Cons. 'A'	163—168	...
107,960	Sept. 20	5¼	4	Mid Kent Ord.	8¾—9¾	...
230,940	Feb. 7	10	10	Oxford & District Ord. ...	202—207	...
47,112	,,	5	5	Do. 5 p.c. Pref.	106—111	...
50,000	,,	6	6	Do. 6 p.c. Red. Pref. ...	108—113	...
126,193	Nov. 15	7½	7½	Peterborough Ord.	158—163	...
64,990	Sept. 6	7½	6½	Redditch Ord....	125—135	...
166,850	Feb. 7	8	8	Romford Ord....	148—153	...
60,000	,,	4	4	Do. 4 p.c. Pref.	97—100	...
44,000	Sept. 20	5	5	Do. 5 p.c. Deb.	113—118	...
25,570	Feb. 7	5½	5½	Rugby 5½ p.c. Pref.	123—128	...
25,000	,,	6	6	Do. 6 p.c. Red. Pref. ...	103—108	...
42,750	Dec. 13	5½	5½	Do. 5½ p.c. Deb.	120—125	...
10,950	Feb. 21	8	8	Ryde Ord.	150—155*	8
270,086	Sept. 6	7	7	Slough Ord.	133—138	...
21,000	Dec. 13	5	5	Do. 5 p.c. Deb.	110—115	...
28,872	Nov. 1	5½	5½	S. Midland Gas Cpn. Ltd. Ord.	19/—21/-	...
28,866	Sept. 6	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	18/6—20/6	...
137,730	Feb. 21	7	7	Southgate & Dist. 7 p.c. max.	138—143*	—2
62,500	,,	5	5	Do. 5 p.c. Pref.	110—115*	...
117,228	Feb. 7	5	5	Swindon Cons.	104—109	...
60,425	Dec. 13	5	5	Do. 5 p.c. Deb.	110—115	...
64,380	Dec. 13	5	5	Torquay and Paignton 5 p.c. Pf.	108—113	...
33,858	Nov. 15	...	-/2·70c	United Kingdom Gas Corpn. 4½ p.c. 1st Cum. Pref. ...	20/—22/-	...
130,000	Feb. 7	5	8	Wakefield Ord.	118—123	...
81,650	,,	5	5	Do. 5 p.c. max.	101—106	...
82,000	Feb. 21	6	6	Weymouth Ord.	110—115	+9
98,384	Feb. 7	6	6	Wolverhampton 6 p.c. Pref....	118—123	...
160,000	Dec. 13	5½	5½	Do. 5½ p.c. Rd. Db.	107—112	...
90,000	Dec. 13	5	5	York 5 p.c. Red. Deb.... ...	104—109	...
133,640	Feb. 21	6¼	6¼	Yorktown (Cam.) 5 p.c. Cons.	126—131*	—2
120,000	,,	5	5	Do. 5 p.c. Pref.	106—111*	—2
35,000	Dec. 13	5½	5½	Do. 5½ p.c. Deb.	121—126	...

BRISTOL EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations, Feb. 25.	Rise or Fall on Week.
347,756	Feb. 7	5	6	Bath Cons.	118—120	...
1,667,250	Feb. 7	5	5	Bristol, 5 p.c. max.	118—119	+1
120,420	Dec. 13	4	4	Do. 1st 4 p.c. Deb. ...	100—102	...
217,870	,,	4	4	Do. 2nd 4 p.c. Deb. ...	100—102	...
328,790	,,	5	5	Do. 5 p.c. Deb.	119—122	...
274,000	Feb. 21	5	5	Newport (Mon.) 5 p.c. max....	98—100*	—2
13,200	Sept. 6	8	7	Pontyp'l Gas & W. 10 p.c. 'A'	13—14	...
13,600	,,	6	5	Do. 7 p.c. 'B'	11⅞—12⅜	...
40,000	,,	6	5	Do. 7 p.c. 'C'	11⅞—12⅜	...
140,778	Feb. 7	5	5	Weston-super-Mare Cons. ...	110—112	...
64,338	Jan. 3	4	4	Do. 4 p.c. Deb.	94½—96½	...
33,340	,,	7½	7½	Do. 7½ p.c. Deb.	154—157	...

LIVERPOOL EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations, Feb. 25.	Rise or Fall on Week.
157,150	Feb. 7	5	6½	Chester 5 p.c. Ord.	103½—107½	...
92,500	Dec. 13	4	4	Do. 4 p.c. Pref.	96—100	...
36,430	,,	3½	3½	Do. 3½ p.c. Deb.... ...	88—91	...
41,890	,,	4	4	Do. 4 p.c. Red. Deb. ...	97—101	...
2,167,410	Feb. 21	6	6	Liverpool 5 p.c. Ord.... ...	123—124*	—2
245,500	Dec. 13	5	5	Do. 5 p.c. Red. Pref. ...	99—104	...
306,083	Jan. 17	4	4	Do. 4 p.c. Deb. ...	100—102	...
106,280	Feb. 7	10	10	Preston 'A' 10 p.c.	202—212	...
188,219	,,	7	7	Do. 'B' 7 p.c.	144—154	...

NEWCASTLE EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations, Feb. 25.	Rise or Fall on Week.
122,577	Feb. 21	8	8	Blyth 5 p.c. Ord.	163½—164½*	—1½
732,000	Feb. 21	5	5	Hartlepool G. & W. Cn. & New	110—112*	—2
2,061,315	Feb. 7	5	5⅜	Newcastle & Gateshead Con.	23/—23/6a	...
682,856	,,	4	4	Do. 4 p.c. Pref. ...	97½—98½	...
776,706	Jan. 3	3½	3½	Do. 3½ p.c. Deb. ...	89½—90½	+1
277,285	Nov. 1	5	5	Do. 5 p.c. Deb. '43...	103—105	...
332,351	Feb. 7	6	6	Sunderland 6 p.c. max. ...	137—139	...

NOTTINGHAM EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations, Feb. 25.	Rise or Fall on Week.
542,270	Aug. 9	9	6	Derby Con.	135—145	...
55,000	Dec. 13	4	4	Do. 4 p.c. Deb.	100—105	...
20,000	Dec. 13	5	5	Long Eaton 5 p.c. Pref. ...	10—12	...
80,000	,,	5	5	Do. 5 p.c. Deb. ...	105—110	...

SHEFFIELD EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations, Feb. 25.	Rise or Fall on Week.
10,000	Feb. 21	10	10	Great Grimsby 'A' Ord. ...	210—220*	...
6,500	,,	10	10	Do. 'B' Ord. ...	210—220*	...
79,000	,,	10	10	Do. 'C' Ord. ...	205—210*	...
1,806,339	Feb. 21	6½	6½	Sheffield Cons.	142—145*	—2½
95,000	Jan. 3	4	4	Do. 4 p.c. Deb.	100—103	...

a The quotation is per £1 of Stock. § Actual for Quarter. c Actual. * Ex div.

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